



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

DE-9J

November 15, 2006

Mr. Ted Jankowski  
Johnson Controls, Inc.  
Director, Corporate Legal Services  
P.O. Box 591  
5757 N. Green Bay Ave., X-75  
Milwaukee, WI. 53201

Re: Johnson Controls, Inc. (JCI)  
Final Decision and Response to Comments Document,  
MID099124299

Dear Mr. Jankowski,

The United States Environmental Protection Agency (USEPA) is issuing to you its Final Decision for Final Corrective Measures (FD) to be implemented at the Johnson Controls, Inc. site located in Fowlerville, Michigan. The Final Corrective Measures are being implemented under the authority of the December 30, 2002, Administrative Order on Consent ("Order") pursuant to Section 3008(h) of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976 (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §6928(h). The Final Corrective Measures chosen for groundwater, soil and sediment contamination are necessary to protect human health and the environment from all current and future unacceptable risks due to releases of hazardous waste or hazardous constituents at or from the facility.

The Statement of Basis Document which included a detailed description and justification for the proposed Final Corrective Measures was made available for review and comment at the Fowlerville District Public Library and the USEPA Region V Records Center, Chicago, IL. The public comment period was held from August 31, 2006 through October 24, 2006. Responses to all comments received are also included in the Final Corrective Measures Document attached with this cover letter. In summary, USEPA has selected Final Corrective Measures of Institutional Controls for Contaminated Soils; Institutional Controls, Deed Restrictions and Long-Term Monitoring for Groundwater;

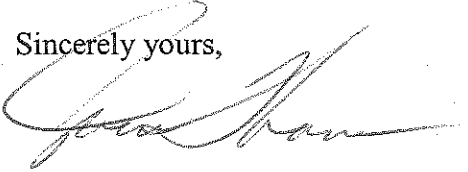
Monitored Natural Attenuation (MNA), and Mixing Zone Determination for Groundwater; and Excavation of Red Cedar River Sediments.

Within 45 days of receipt of this Final Decision and Response to Comments, Johnson Controls, Inc., must submit a Corrective Measures Implementation Program Workplan and Schedule for USEPA's approval. Within 30 days of USEPA's approval of the Workplan and Schedule, Johnsons Controls, Inc. must commence the work. JCI will provide a Final Remedy Construction Completion Report documenting all work that it has performed pursuant to the USEPA's Final Decision and approved schedule. If ongoing monitoring or operation and maintenance is required after construction of the Final Corrective Measures, Johnson Controls, Inc. must include an Operations and Maintenance Plan in the Final Remedy Construction Completion Report.

USEPA is looking forward to its continued cooperation with JCI in the implementation of the Final Corrective Measures. USEPA also appreciates all remedial activities implemented to date that were necessary in protecting human health and the environment.

I am available to you at 312-886-6010 for any concerns that you may have.

Sincerely yours,

A handwritten signature in dark ink, appearing to read 'Juan Thomas', is written over the closing 'Sincerely yours,'.

Juan Thomas, MPH  
Project Manager

cc: Dennis Reis  
Tom Williams, ORC



JENNIFER M. GRANHOLM  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING DISTRICT OFFICE



STEVEN E. CHESTER  
DIRECTOR

March 17, 2004

Mr. Geoffrey Gallinger  
Raymond & Prokop, P.C.  
26300 Northwestern Highway, 4<sup>th</sup> floor  
Southfield, MI 48086-5058

Dear Mr. Gallinger:

SUBJECT: Sump and Retention Pond Sampling Results for  
605 and 626 Garden Court, Fowlerville, Livingston County, Michigan

Enclosed are analytical results for two sump water samples and two retention pond samples collected at the above referenced locations on February 27, 2004 by the Michigan Department of Environmental Quality (MDEQ), Remediation and Redevelopment Division (RRD).

The water samples were analyzed for volatile organic compounds due to the filing of a "Notice of Migration of Contamination" (NOM) report for Stanley Tools / Hoover Ball Bearing facility at 425 Frank Street, Fowlerville, as per rules of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The NOM report indicated that trichloroethylene (TCE), a chlorinated volatile organic compound, may be present in the groundwater at levels exceeding criteria protective of drinking water and surface water beyond the property line.

Groundwater at the Johnson Controls facility flows towards the Red Cedar River which bounds the facility to the west and west southwest. Garden Court residences are south and southwest of the Stanley Tools south property line. A railroad track is between the properties.

Analytical results for the sump samples, retention pond samples and trip blank indicate that no volatile organic compounds were present above the method detection limits. Please note that compounds with "#" in front of them were injected into the sample as internal quality control and are intended for detection by the analytical equipment (gas chromatograph and mass spectrometer).

Please contact me at 517-335-6247 or [taylorre@michigan.gov](mailto:taylorre@michigan.gov) if you have any questions regarding these water samples. Please contact David Slayton, MDEQ, Waste and Hazardous Materials Division, at 517-373-8012 or [slaytond@michigan.gov](mailto:slaytond@michigan.gov) if you have general questions regarding the Johnson Controls Fowlerville facility.

March 17, 2004

Please contact the U.S. Environmental Protection Act (U.S. EPA) project manager, Juan Thomas, at 312-886-6010 if you have any questions regarding remedial work under the U.S. EPA consent agreement.

Sincerely,



Rebecca Taylor  
Environmental Quality Analyst  
Remediation and Redevelopment Division

Enclosure

cc: Mr. Juan Thomas, U.S. EPA  
Mr. David Slayton, MDEQ  
Ms. Kathy Shirey, MDEQ

cc/enc: Greg and Michelle Paddock, 605 Garden Court  
Kim Thomas, 625 Garden Court



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Division: RRD  
Report to: REBECCA TAYLOR  
MDEQ-RRD-LANSING  
CONSTITUTION HALL  
525 W. ALLEGAN, LANSING, MI 48909

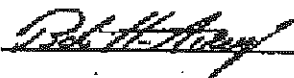
Total: \$500.00

Lab Work Order #: 40200184  
Work Site ID: LB030133  
Site Name: GARDEN COURT SUMPS  
Received: 02/27/2004  
Reported: 03/11/2004  
Collected By: REBECCA TAYLOR

Samples Received :

No:	Sample ID	Sample Description	Matrix:	Collection Date
01	AA25753	605-GC-SUMP	WATER	02/27/2004
02	AA25754	626-GC-SUMP	WATER	02/27/2004
03	AA25755	RP-EAST	WATER	02/27/2004
04	AA25756	RP-WEST	WATER	02/27/2004
05	AA25757	TB-1	WATER	02/27/2004

I certify that the analysis performed by the MDEQ Environmental Laboratory are accurate and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency and other appropriate regulatory agencies.

  
Bob Avery, Laboratory Director



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25753 605-GC-SUMP

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/01/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	98.7			
SURROGATE	#Dibromofluoromethane#	105			
SURROGATE	#Toluene-d8#	97.8			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
96-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
77-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0		1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number  
RL : Reporting Limit  
ND : Not Detected

ug / L : microgram / liter (ppb)  
mg / L : milligram / liter (ppm)  
ug / Kg : microgram / kilogram (ppb)  
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Laboratory Contacts  
Inorganic Unit Mgr: Sandy Gregg  
Organic Unit Mgr: Carol Smith  
Systems Mgmt Unit: George Krisztian



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Volatile Compounds

Analytical Method: 8260

Date Tested: 03/01/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
55-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0		1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

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Sample Number: AA25754 626-GC-SUMP

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	97.9			
SURROGATE	#Dibromofluoromethane#	101			
SURROGATE	#Toluene-d8#	97.7			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
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87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0	O	1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
96-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
77-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X O	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	O	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0		1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
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75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
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108383,106423	m & p - Xylene	Not Detected	2.0	O	1.0
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75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	XO	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
55-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
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109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
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79-01-6	Trichloroethylene	Not Detected	1.0		1.0
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P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25755 RP-EAST

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	97.7			
SURROGATE	#Dibromofluoromethane#	101			
SURROGATE	#Toluene-d8#	99			
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71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
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79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
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96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
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108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number  
RL : Reporting Limit  
ND : Not Detected

ug / L : microgram / liter (ppb)  
mg / L : milligram / liter (ppm)  
ug / Kg : microgram / kilogram (ppb)  
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Inorganic Unit Mgr: Sandy Gregg  
Organic Unit Mgr: Carol Smith  
Systems Mgmt Unit: George Krisztian



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25755 RP-EAST

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0	O	1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
547-6	o-Xylene	Not Detected	1.0		1.0
87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
55-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0		1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number  
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ug / L : microgram / liter (ppb)  
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ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25756 RP-WEST

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	98.4			
SURROGATE	#Dibromofluoromethane#	102			
SURROGATE	#Toluene-d8#	97.8			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
96-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
57-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0		1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number  
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TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25756 RP-WEST

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
5-47-6	o-Xylene	Not Detected	1.0		1.0
87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
35-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0		1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number  
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P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Sample Number: AA25757 TB-1

Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	97.9			
SURROGATE	#Dibromofluoromethane#	102			
SURROGATE	#Toluene-d8#	98.4			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0		1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0

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Volatile Compounds

Analytical Method: 8260

Date Tested: 03/02/2004

Analyst: JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
47-6	o-Xylene	Not Detected	1.0		1.0
37-6	p-Isopropyl toluene	Not Detected	1.0		1.0
155-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0		1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

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<u>Qualifier Code</u>	<u>Qualifier Description</u>
A	Value reported is the mean of two or more determinations.
C	Value calculated from other independent parameters.
D	Analyte value quantified from a dilution(s); reporting limit (RL) raised.
E	Result is estimated due to high recovery of batch QC.
F	Free cyanide was not analyzed due to low level of total cyanide.
G	Result and RL are estimated due to initial calibration standard criteria failure.
H	Recommended laboratory holding time was exceeded.
I	Dilution required due to matrix interference; reporting limit (RL) raised.
J	Analyte was positively identified. Value is an estimate.
JA	Result is estimated due to multiple Aroclors present.
JC	Result is estimated since confirmation analysis did not meet acceptance criteria
JD	Due to severe degradation, specific Aroclor identification is difficult and quantitation is estimated.
K	RL(s) raised due to matrix interferences.
LB	Reported library search compounds are tentative identifications with estimated concentrations.
M	The level of the method preparation blank (MPB) is reported in the qualifier column.
N	Non-homogeneous sample made analysis of sample questionable.
O	Result and RL estimated due to analysis from an open vial.
P	Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
Q	Quantity of sample insufficient to perform analyses requested.
R	Result confirmed by re-extraction and analysis.
S	Supernatant analyzed.
T	Reported value is less than the reporting limit (RL).
V	Value not available due to dilution.
W	Reported value is less than the method detection limit (MDL).
X	Methods 8260 & 624 are used to analyze volatile organics that have boiling points below 200°C. 2-Methylnaphthalene & naphthalene have boiling points above 200°C and are better suited to analysis by methods 8270 or 625 as semivolatile organics.
1	Result(s) and RL(s) are estimated due to low surrogate recovery.
2	Result is estimated due to high surrogate recovery.
3	Result(s) and RL(s) are estimated due to low matrix spike recovery.
4	Result is estimated due to high matrix spike recovery.
5	Result and RL are estimated due to low continuing calibration standard criteria failure.
6	Result is estimated due to high continuing calibration standard criteria failure.
7	Result(s) and RL(s) are estimated due to poor precision.
8	Result(s) and RL(s) are estimated due to low recovery of batch QC.
KR	RL(s) raised due to low sample volume submitted.
KS	RL(s) raised due to low total solids.
KW	RL(s) raised due to light sample weight.
9	Result outside QC acceptance criteria.

CAS# : Chemical Abstract Service Registry Number  
RL : Reporting Limit  
ND : Not Detected

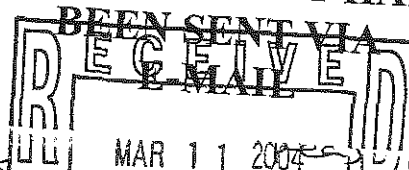
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MICHIGAN DEPT. OF ENVIRONMENTAL LABORATORY  
ANALYSIS REQUEST

FINAL REPORT HAS



LAB ORDER # 40200184

SITE CODE NUMBER

SITE NAME

Garden Court Sumps

DIVISION

DISTRICT/OFFICE

MDEQ PROJECT MANAGER

E-MAIL ADDRESS

PHONE

ACCEPT HT CODES?

YES/NO

RRD

Lansing D.O.

Rebecca Taylor

33 DEQ 6247

PRIMARY CONTACT PERSON

PHONE

Taylorre

Rebecca Taylor

335-6247

@mi.gov

LANSING DISTRICT OFFICE

04 47959

32511

1ST CHOICE:

Trimethox

OVERFLOW LAB (Required for RRD & CMI samples)

2ND CHOICE:

Trace / AA Trimethox

COLLECTED BY

Rebecca Taylor

PROJECT: 453436

PH: 00

E-MAIL ADDRESSES TO SEND ADDITIONAL REPORTS TO:

FORMATION REQUIRED \*\*\*\*

ACK OF FORM

1	LAB USE ONLY	SAMPLE DESCRIPTION	SAMPLE COLLECTED		COMMENTS
			DATE MM/DD/YY	TIME MILITARY	
1	AA 25753	605-GC - Sump	2/27/04	13:00	expect low to ND
2	AA 54	626-GC - Sump		13:15	
3	AA 55	RP - east		13:30	
4	AA 56	RP - west		13:40	
5	AA 57	TB - 1		13:50	
6	AA				
7	AA				
8	AA				
9	AA				
10	AA				

ORGANIC

GENERAL CHEMISTRY

INORGANIC

VOA VOLATILES (8260)	DO Diss Oxygen	MA Total Metals
Full List 1 2 3 4 5 6 7 8 9 10	GN NO <sub>3</sub> o-Phos 1 2 3 4 5 6 7 8 9 10	MAD Diss-Field Filtered 1 2 3 4 5 6 7 8 9 10
BTEX/MTBE only 1 2 3 4 5 6 7 8 9 10	Residue SS 1 2 3 4 5 6 7 8 9 10	MD Diss-Lab Filtered 1 2 3 4 5 6 7 8 9 10
ON PESTICIDES/PCBS (8081/8082)	Residue TDS 1 2 3 4 5 6 7 8 9 10	MICH TEN METALS 1 2 3 4 5 6 7 8 9 10
Pesticides & PCBs 1 2 3 4 5 6 7 8 9 10	BOD Tot 5 day 1 2 3 4 5 6 7 8 9 10	(As, Ba, Cd, Cr, Cu, Pb, Hg, Se, Ag, Zn)
Pesticides only 1 2 3 4 5 6 7 8 9 10	BOD Carb 5 day 1 2 3 4 5 6 7 8 9 10	Fe Co Li Mn 1 2 3 4 5 6 7 8 9 10
PCBs only 1 2 3 4 5 6 7 8 9 10	CA Chlorophyll 1 2 3 4 5 6 7 8 9 10	Al Be Mo Ti V 1 2 3 4 5 6 7 8 9 10
BNA BASE NEUTRAL & ACIDS (8270)	GA COD 1 2 3 4 5 6 7 8 9 10	B Sr 1 2 3 4 5 6 7 8 9 10
BNAs 1 2 3 4 5 6 7 8 9 10	TOC 1 2 3 4 5 6 7 8 9 10	Ni - Nickel 1 2 3 4 5 6 7 8 9 10
PNAs only 1 2 3 4 5 6 7 8 9 10	NO <sub>3</sub> + NO <sub>2</sub> , NH <sub>3</sub> 1 2 3 4 5 6 7 8 9 10	Sb - Antimony 1 2 3 4 5 6 7 8 9 10
BNs only 1 2 3 4 5 6 7 8 9 10	KJELN, Tot P 1 2 3 4 5 6 7 8 9 10	Tl - Thallium 1 2 3 4 5 6 7 8 9 10
ACIDs only 1 2 3 4 5 6 7 8 9 10	S Sulfide 1 2 3 4 5 6 7 8 9 10	Ca Mg Na K 1 2 3 4 5 6 7 8 9 10
SPECIAL REQUESTS	GP Phenolics 1 2 3 4 5 6 7 8 9 10	Hardness 1 2 3 4 5 6 7 8 9 10
Library Search (Qualitative)	GB Total CN 1 2 3 4 5 6 7 8 9 10	MN pH, Conductance 1 2 3 4 5 6 7 8 9 10
Volatiles 1 2 3 4 5 6 7 8 9 10	Amenable CN 1 2 3 4 5 6 7 8 9 10	Cl, SO <sub>4</sub> , Total Alk 1 2 3 4 5 6 7 8 9 10
Semivolatiles 1 2 3 4 5 6 7 8 9 10		HCO <sub>3</sub> , CO <sub>3</sub> 1 2 3 4 5 6 7 8 9 10
FingerPrint 1 2 3 4 5 6 7 8 9 10		Cr <sup>6+</sup> 1 2 3 4 5 6 7 8 9 10
		OG Oil & Grease 1 2 3 4 5 6 7 8 9 10

Chain-of-Custody	RELEASED BY / ORGANIZATION		RECEIVED BY / ORGANIZATION		DATE	TIME
	Print Name & Organization	Signature	Print Name & Organization	Signature		
	Rebecca Taylor	Rebecca Taylor	Ross Duman	Ross Duman	2/27/04	1440
	Signature	Signature	Signature	Signature		
	Print Name & Organization	Signature	Print Name & Organization	Signature		
	Signature	Signature	Signature	Signature		
	Print Name & Organization	Signature	Print Name & Organization	Signature		
	Signature	Signature	Signature	Signature		



September 6, 2001

U.S. Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

Attention: Mr. Juan Thomas, Project Manager

Subject: Confirmation of Extended Deadline  
Final RFI Report  
Former Stanley Tools Facility, Fowlerville, MI

At the request of Johnson Controls, Inc. (JCI), URS has prepared this letter as confirmation of a requested extended deadline for submittal of a Final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for the Former Stanley Tools Facility located in Fowlerville, Michigan.

During a phone conversation with Mr. Juan Thomas on August 23, 2001, a new date of September 30, 2001 was established and agreed upon for submittal of the Final RFI Report. This extension will allow us to incorporate into the Final RFI Report new data collected during the Interim Stabilization Measures activities performed August 15 through 21, 2001.

If there are any questions regarding the content of this letter or the status of the project, please do not hesitate to contact the undersigned at 513-651-3440 or Mr. Dennis Reis at 414-277-5523.

Sincerely,

URS



Michael A. Wagner  
Project Manager



Dennis P. Connair, C.P.G.  
Principal

MAW/DPC:JCI(020)121  
20209-020-121

cc: D. Reis, Quarles & Brady  
M. Stoelton, JCI

URS Corporation  
36 East 7th Street, Suite 2300  
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Fax: 513.651.3452



**PHOTOGRAPH 1:** North excavation, looking south.



**PHOTOGRAPH 2:** North excavation, looking west.

**Johnson Controls, Inc.**  
FORMERLY STANLEY TOOLS FACILITY  
FOWLerville, MICHIGAN

**FIGURE 1**  
**INTERIM STABILIZATION MEASURES**  
**CONFIRMATION OF COMPLETION**  
**PERMIT NO. 01-47-0001-P**


JOB NO. 20209-019-121

**URS**



# MEMORANDUM

**TO:** Juan Thomas - U.S. EPA

**FROM:** John Koehnen - TechLaw 

**SUBJECT:** Meeting Minutes/Summary for March 14, 2002 Meeting with Public Group regarding Johnson Controls, Inc. (JCI) Fowlerville Site

**DATE:** March 18, 2002

cc: T. Manning

Juan, as discussed, below is a brief summary of the March 14, 2002 meeting between U.S. EPA and the Environmental/Public Group interested in Corrective Actions at the JCI Site in Fowlerville, MI. I have used my notes, as well as those provided to me by Ms. Carolyn Bury of U.S. EPA in generating this summary. Please make any edits you feel are needed to accurately reflect the discussions of March 14, 2002.

The meeting was held on March 14, 2002 from approximately 1:00 PM to 3:00 PM. The participants and their respective affiliations include:

Andrew Comai, UAW International  
 Dan Smith, Cons Chair UAW Local 602  
 James Clift, Michigan Environmental Council  
 Cindy Roper, Clean Water Action (phone)  
 Juan Thomas, U.S. EPA  
 Tony Martig, U.S. EPA  
 Carolyn Bury, U.S. EPA

Steve Amter, Disposal Safety Inc.  
 Albert Ettinger, Sierra Club  
 Mike Garfield, Ecology Center  
 George Hamper, U.S. EPA  
 Tom Williams, U.S. EPA Legal  
 Karen Thompson, U.S. EPA PR  
 John Koehnen, TechLaw, Inc.

The meeting was initiated with a series of introductions by all participants. After the introductions, Mr. Hamper provided a summary of the overall RCRA Corrective Action process, including the interconnection with CERCLA as well as the broader authorities provided under HSWA in 1984. As well, Mr. Hamper discussed the specifics of the current JCI Order on Consent, which is essentially limited to the RFI phases and does not include provisions for the conduct of required Corrective Measures. Mr. Hamper further discussed the options that U.S. EPA has in proceeding with the action. This includes working to fully complete the RFI (i.e., full nature and extent of contamination defined) under the current order while negotiating a supplemental (new) order to cover the corrective measures.

Following the summary of the RCRA process, and the current status of the Consent Orders with JCI, Mr. Thomas presented a brief discussion on his interpretation of the current problems at the JCI site. Mr. Thomas also discussed the historical Interim Measures (IM) which have been conducted at the site. These included: the sludge and soil removal from SWMUs, tank removal and the recent IM along the banks of the Red Cedar River to control the ongoing release of contamination to the River through buried pipelines. In addition, Mr. Thomas discussed the rationale for requiring JCI to consolidate and submit an RFI Summary. Mr. Thomas indicated that U.S. EPA was still reviewing the RFI Summary Report and that the U.S. EPA certainly has noted data gaps that still exist.

At this time, Mr. Comai discussed whether these actions were adequate to protect the public and the environment, more specifically whether the recent IM was an adequate step. In response, Mr. Hamper provided a brief discussion of the IM and the means to which this would control any releases to the Red Cedar River. Mr. Comai and others again questioned whether this action was enough. Mr. Koehnen reiterated the specific rationale for the IM, noting that the goal was to address an immediate need to control and eliminate the ongoing releases to the Red Cedar River through the buried pipelines. The IM was not designed to be a final Corrective Measure, but rather a means to control these ongoing concerns until such time as longer term Corrective Measures can be put into place. Mr. Koehnen more specifically discussed the installation of the IM and that U.S. EPA/TechLaw still see residual concerns related to the IM action.

At this time, Mr. Amter provided a summary of the Disposal Safety Inc. Report which included an evaluation of several historical documents, including each of the Phased RFI Reports and the RFI Summary Report. Mr. Amter noted several key concerns that appear to be inadequately, or inaccurately, defined in the varied RFI-related submittals. These include, but are not limited to:

- Data provided in these documents does not support the conclusions presented.
- Extent of PCBs in the sediment and River banks has not been adequately defined.
- Extent of "Petroleum" contamination not well defined.
- Tone of Report tends to deflect concern and appears to incorrectly indicate the concentrations and contaminants are not problematic.
- TCE plume does not appear to be three separate plumes as presented, is not likely attenuating as presented, and the term "Offsite" as used in the RFI Summary Report is misleading and likely inaccurate.
- A local well user may be located within ½ mile of the facility.
- Sediment information in RFI Summary does not appear accurate in that the statistical issues are not well defined, the upstream concentrations were used in the SLERA and the arsenic and cyanide concentrations are too high as compared to other background values
- Finally, DSI, and the Group strongly suggest that U.S. EPA conduct future risk assessments to ensure that no biases are introduced into process by JCI.

In response to Mr. Amters' discussion of the concerns related to the RFI at the JCI site, Mr Koehnen stated that U.S. EPA and TechLaw share many of the same concerns. However, since the technical review of these RFI-related submittals is not completed and has not been presented



to JCI, U.S. EPA was not at liberty to fully discuss them at this time. It was noted however, that the next steps at the site are not clear at this time. The noted data gaps would make it difficult to progress to the CMS phase, as the nature and extent needs to be fully delineated to allow for an accurate evaluation of Risk, which is a natural precursor to moving into the Corrective Measures phases. With that, it is noted that there are more immediate concerns at the site, and if the progression does not lend itself to getting into the CMS phase, that additional IMs may potentially be warranted.

In response the discussions on the RFI and the potential time line, Mr. Ettinger and Mr. Garfield questioned whether there are current discharges of contaminants to the Red Cedar River. As well, it was questioned whether we have enough data/data points to determine this. Mr. Koehnen responded that this is uncertain at this time, but the potential exists that there are ongoing releases to the River. It was not yet determined whether additional monitoring points would be needed to assess these conditions. The potential exists that the site, and the contamination could be considered holistically in that any future corrective measures could control any release to the river in general, and not specifically within an area or from a specific unit. This approach has not been discussed with JCI, as the anticipated future uses of the site have not been communicated to U.S. EPA. The group as a whole also expressed concern over the general environmental conditions at the site and stated that the site is within the flood plain and the potential exists that contaminants would be released should a moderate flood occur. In addition, the group provided relevant information on the population in this area and the uses of the Red Cedar River for both fishing and other recreation, noting that carp and pike are likely to be some of the species of fish located in the area around the JCI site. Mr. Comai also discussed the recent development of the property immediately south of the facility. This area is now a housing subdivision and is was noted that children play near the JCI site on a regular basis. Of particular concern, was the location of SWMU I. The SWMU is located within the drainage ditch to the south of the JCI Site, outside of the fence line with no noted warning signs to inform the public of the potential concerns associated with the site. U.S. EPA took note of these concerns.

Mr. Hamper and Mr. Thomas then discussed the next phase of the process and what could be expected. Mr. Hamper indicated that the first step would be for U.S. EPA to complete its review the RFI Summary Report and provide this information to JCI. Mr. Hamper indicated that he expected that step could be completed within a month. Mr. Hamper also indicated that it was U.S. EPA's hope that work on a new or amended Order could be conducted contemporaneously with other RFI or CMS activities. Mr. Hamper also reiterated the potential time lines and other options that could be used to compel corrective measures at the JCI Site. At this time, Mr. Williams described the process from the legal perspective, noting that it is not certain that JCI will be cooperative in moving into, or approving, a new or amended Order to conduct a CMS. As well, due to liability reasons, the process does not typically include the actual implementation of the defined corrective measures. Due to the requirement that multiple Orders be developed, the process could take several months to well over a year to complete. Mr. Hamper stated that it was U.S. EPA's hope that the facility would be amenable to these actions and that at a minimum, U.S. EPA felt it could be possible to be working on both completing the RFI and moving the process into the CMS phase by generating an Order at the same time. The Public Group asked



several questions regarding the process outlined above, with the primary goal of determining whether this process would hamper any efforts to prevent current or future releases.

Lastly, before the meeting concluded, the Public Group asked whether the possibility existed that they could form a citizens committee related to the JCI Site. Mr. Hamper indicated that there was certainly nothing to stop them from doing that, and that U.S. EPA could neither prohibit that or sanction it. Mr. Hamper noted that he personally felt it was a good idea and he urged the group to get JCI involved as well, and that JCI's resources may make it easier to function. Ms. Thompson then discussed some of U.S. EPA's programs in this regard. Ms. Thompson stated that the personnel in her section (U.S. EPA Community Relations) were being used on RCRA-related projects more frequently of late since the CERCLA program is slowing down as the numbers of facilities with active operations are reduced. Ms. Thompson also noted that a Liaison will be assigned to the JCI site and would be available to help coordinate some of the activities that the group was interested in conducting. Mr. Comai volunteered to be the point of contact for the U.S. EPA Community Relations Liaison. All parties thought that this was an acceptable resolution.

Additional side-bar discussions were held and the meeting adjourned at approximately 3:00 PM.



## Waste, Pesticides and Toxics Division

File w/  
admin.  
record

Type of Document: Final Decision & Response to Comments

Name of Document (Facility Name & Location): Johnson Controls, Inc.  
Fowlerville, Michigan

Document # (EPA ID#) MID 099 124 299 Originator/Phone: 6-6010

*NOTE: Originator and first level supervisor are responsible for assuring that documents are in plain language. All other reviewers should consider plain language in their reviews. See the plain language checklist on the reverse side of this sheet.*

Date	Name	Secretary/Chief Initials
11/15/2006	Author: Juan Thomas	J.T.
11-15-2006	George Hamper, ECAB Section Chief	George Hamper
11/15/06	Gerry Phillips, Corrective Action Manager	Gerry Phillips
11/21/06	Tom Williams, Asst. Reg. Counsel	Tom Williams
11/29/06	Janice Loughlin Chief, ORC Section	J.L.
12/1/06	Margaret Guerriero, Director Waste, Pesticides and Toxics Division	BPJ for MMS

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(attach official file copy/return w/originator's Copy)

Correction Required \_\_\_\_\_


REMARKS/COMMENTS

Report No. 54

REVIEW OF ENVIRONMENTAL INVESTIGATIONS  
AT JOHNSON CONTROLS'  
FOWLerville, MICHIGAN, SITE

January 9, 2002

**Disposal Safety Incorporated**

1701 K Street, NW, Suite 510  
Washington, DC 20006  
(202) 293-3993  21

REVIEW OF ENVIRONMENTAL INVESTIGATIONS  
AT JOHNSON CONTROLS'  
FOWLerville, MICHIGAN, SITE

January 9, 2002

prepared by:

Disposal Safety Incorporated  
1701 K Street NW, Suite 510  
Washington, DC 20006

prepared for:

AFL-CIO  
815 Sixteenth St. NW  
Washington, DC 20006

### Notice

This report has been prepared solely for the guidance of the AFL-CIO in interpreting information available to it. Other users should satisfy themselves *independently* as to facts and conclusions contained herein. In particular, such users should refer to original sources of information rather than to this report. This report is not intended for use in any real estate or other transaction, and should not be used or relied upon for such purposes.

## Summary

Wastes from the Johnson Controls Inc. (JCI) site in Fowlerville, Michigan, have contaminated soil and ground water at the plant and sediment in the Red Cedar River. A plume of ground water contaminated by high concentrations of the solvent trichloroethylene (TCE) and its breakdown products forms an east-west band across the southern portion of the plant and discharges into the river. River sediment contains elevated levels of polychlorinated biphenyls (PCBs), chromium, and other chemicals adjacent to the plant and for a distance of a mile or more downstream.

It is now more than twenty years since ground-water contamination was discovered beneath the site and PCBs were discovered in the river. Yet no long-term remedy has yet been selected, let alone implemented. JCI has studied the site pursuant to USEPA requirements, but we have identified several serious deficiencies in their investigation and evaluation.

Johnson Controls did not properly evaluate sediment contamination in the Red Cedar River. JCI compared the sediment data to three decreasingly stringent criteria, erroneously concluding that the least stringent set (which JCI itself developed) was most applicable to the site data. All three comparisons show that there is a problem in the river, yet JCI downplayed this result and concluded that there is little present-day impact on the Red Cedar River from the site. Specific problems with the sediment evaluation include:

- Polychlorinated biphenyls were not detected in any upstream samples, but were present in the sediment nearby and downstream of the site at levels above USEPA standards. JCI never stated the obvious conclusion that the plant has contaminated the river with PCBs.
- Johnson Controls dismissed the USEPA standards for river sediments, arguing that they are too conservative to use to identify site-related contamination. USEPA's Ecological Data Quality Levels are tied to protecting river ecology, not distinguishing background concentrations from site-derived contamination. The presence of background contamination is no reason to ignore these standards.
- Johnson Controls defined a statistical criterion for identifying site-related contamination and then dismissed it, arguing that this criterion too is overly conservative. JCI's statistical analysis had severe shortcomings. The upstream river samples were too few and samples that had been collected years apart were improperly combined into a single

data set. Even if it had been properly applied, JCI's statistical test is ill-suited to determining whether its plant has contaminated the river.

- Johnson Controls argued that the best way to distinguish site-related contamination is to consider samples to be contaminated only if they have higher concentrations than *all* background samples. This criterion is distinctly non-conservative and can erroneously screen out contaminated samples. Moreover, JCI chose its maximum background concentrations from a data set in which roughly two thirds of the samples were collected six years earlier than the downstream samples. It is probable that upstream of the plant the river is being cleaned up and contamination is declining, making it improper to use old measurements to evaluate current background conditions in the river.

While river conditions downstream of the plant have improved over time, sediment remains contaminated 15 years after the plant stopped operating. This problem requires further action. JCI should implement a comprehensive program to control contaminated runoff and discharge from the site. This program should include clean-up of on-site ground water, surface water, sludge, contaminated soils, and storm water.

Because most of the site is situated on the flood plain of the Red Cedar River, remedial measures must be put into place to prevent contaminated soil from washing into the river during large-scale floods. This might include either excavation or capping of appropriate areas. Special attention also needs to be given to PCBs that are dissolved in kerosene.

Decisions about whether and how to clean up contaminated sediments in the river are likely to be based on a risk assessment. Because risk assessment is a process that involves much judgement, it is important to avoid the appearance and the reality of bias. All risk assessments at this site should be conducted by USEPA personnel rather than JCI's consultants.

As with the river sediments, JCI's discussion of arsenic in soil is based on a flawed statistical analysis of background contamination. The arsenic problem requires further investigation to determine what kind of clean-up is necessary.

We have also identified serious problems in JCI's evaluation of ground-water contamination by TCE and other industrial solvents:

- Johnson Controls concluded after Phase II that the plume of TCE-contaminated ground water might originate off site — that is, that some other company may have caused the



problem. Although a primary objective of the Phase III investigation was to better define the source areas of the TCE plume, the Phase III report does not identify the source areas.

- The Phase III RFI report misleadingly depicts the TCE plume in ways that minimize its seriousness. The plume is depicted as three hotspots, with concentration contours that suggest that little contamination reaches the river. However, there is little support for this interpretation. The existing data are too sparse to fully determine the plume configuration, and they support an interpretation in which a continuous contaminant plume with a central spine of high concentrations reaches all the way to the river at least as well as they support JCI's interpretation.
- JCI wrongly claims that the TCE plume "is not expected to persist at significant concentrations because of its demonstrated attenuation away from source areas." In fact, the plume is not cleaning itself up. Although it is true that TCE is degrading to some extent in portions of the plume, the process does not go to completion. TCE and its daughter products remain in all sectors of the plume at concentrations hundreds to thousands of times above standards.
- In the western portion of the plume, where TCE degradation appears to be most advanced because no TCE was detected, there is still 8,370 ppb of DCE and 1700 ppb of vinyl chloride, two degradation products of TCE. Vinyl chloride is more toxic than TCE.
- The number of wells is insufficient to define the vertical configuration of the TCE plume and to determine whether contamination may be migrating under the river.

Despite the data gaps that exist, it is still possible to consider different remedial options and define required future work. Additional work will be needed to determine TCE source areas and the depth of the VOC plume. Additional permanent wells are recommended both on-site, along the length of the plume, and off-site east of the plant boundary and on the west side of the river. Several of these will need to sample water from the deep zone.

Under present conditions it is clear that natural attenuation does not fully degrade the plume before it moves off site. Therefore, natural attenuation is not viable as a stand-alone remedy. Also, the biological and chemical processes that are partially degrading the TCE are insufficiently understood to consider natural attenuation even as a component of an engineered remedy.

After two decades of study, action to contain the solvent plume is overdue. Several cost-effective methods, including well-based hydraulic containment and zero-valence treatment walls, are available to do this. If additional investigation identifies strong TCE source areas, then containment, treatment, or removal measures at the source area should be required.

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## 1. Introduction

The purpose of this report is to evaluate the RCRA Facility Investigation (RFI) performed by Johnson Controls, Inc. (JCI) at the former Stanley Tools facility in Fowlerville, Michigan. The facility was previously owned by Hoover Universal, Inc., which was bought by JCI in 1985. The RFI was conducted under a Consent Order negotiated between Stanley Tools and USEPA in 1988. Remedy selection will be covered by a future Consent Order currently under negotiation. Because this is a complex site with a long history, this report will not attempt to cover all issues relating to the site, but will focus on those most important to long-term remedy selection.

### 1.1 Reports reviewed

The RFI provides the primary technical basis for selecting a long-term remedy for the site. Our evaluation focuses on the adequacy of the data collected to date, the quality of interpretation and analysis, and implications for cleaning up the site.

The key documents in our review are the October 2001 *Summary Report, RCRA Facility Investigation - Task 10* and the December 2000 *Phase III RCRA Facility Investigation Task 10* report, both prepared by JCI's consultant, URS. The Summary Report, which is currently under review by USEPA, provides an overview of investigations at the site. The Phase III Report contains the results and analysis of recent additional investigations required by USEPA Region 5 on contaminant distributions and source areas. Two other important documents are the 1991 *Phase I RCRA Facility Investigation Task 10* report and the 1994 draft *Phase II RCRA Facility Investigation Task 10* report, both prepared by Dames & Moore, consultant to Stanley Tools.

### 1.2 Organization of this report

Section 2 of this report briefly summarizes the background and history of the site, including an overview of past investigations. Section 3 describes the physical setting of the JCI facility. Sections 4, 5 and 6 discuss the findings of JCI's most recent investigation and identify deficiencies in JCI's analysis of the data. Section 7 discusses possible remedies for the contamination and presents some recommendations for the next phase of work.

## 2. Background and history

Johnson Controls' Fowlerville site has a long and complex history of ownership, operations, and regulatory oversight, which is briefly summarized in this section. More detailed information is found in the RFI reports.

### 2.1 Ownership

The JCI facility is located at 425 Frank Street in Fowlerville, Michigan. Beginning in 1949, the 14-acre site housed a company which cast zinc-based automotive and plumbing parts, some of which were electroplated. In the late 1960s, the plant was bought by Hoover Ball and Bearing Company, later called Hoover Universal Incorporated, Die Cast Division. In 1980, Stanley Tools bought the plant and manufactured plated, die-cast hand tools until 1985. Through its 1985 purchase of Hoover Universal, JCI assumed Hoover Universal's liability for the site. In 1996, JCI entered an agreement to assume total ownership and responsibility for the site [Kolesar, 1996].

### 2.2 Wastes and discharges

The Red Cedar River is the JCI plant's western boundary. A variety of chemical wastes from metal plating has been treated at the site and discharged into the river since the 1950s. These chemicals include cyanide, chromic acid, and various metals. Production wastes were treated in tanks and ponds to reduce toxicity or separate solids, and the treated wastes were discharged into ditches or pipes that led into the river. Kerosene (used to clean molds) and oils were also separated from aqueous wastes in ponds. In all, there were at least five unlined treatment or settling ponds. Accumulated sludges from the ponds were spread or buried on site.

In 1970, the facility constructed a wastewater treatment plant which included four additional ponds. Sludge from these new ponds was chemically treated and buried on site. The plant also had several storm sewer and tile drain systems that discharged metal-contaminated water into the river.

### 2.3 Discharge permits

The plant's industrial wastewater discharges into the river have been regulated since the early years of operation. In 1953, the Michigan Water Resources Commission limited the volume of the plant's electroplating process wastewater to 20,000 gallons per minute and required that concentrations of cyanide and various metals be no more than 2 parts per million (ppm). Beginning in the 1970s, the Clean Water Act's permit program regulated the discharges and required that the average concentrations be lowered by 20 to 90 percent.

### 2.4 Investigations

Table 3-1 of the Phase II report contains a list of reports generated by past investigations and studies at the site. This is reproduced in this report as Appendix A. More than two dozen documents are listed; many are dated prior to 1980.

Industrial wastewater surveys and monitoring of discharges into the Red Cedar River began in the early 1950s, under state regulatory programs. In the late 1970s, a system of wells was installed to monitor ground-water contamination. Initially, the wells were tested for metals and cyanide associated with casting and plating operations. The Michigan Department of Natural Resources, the predecessor agency of the Department of Environmental Quality (MDEQ), studied suspended sediment in the Red Cedar river in 1978. It found high concentrations of cyanide, metals, and PCBs. In 1980, Stanley Tools notified USEPA that it handled hazardous waste at the plant, and filed for a Resource Conservation and Recovery Act (RCRA) Part A permit. Detection of ground-water contamination triggered RCRA requirements for an on-going ground-water quality assessment.

In 1988, USEPA and Stanley Tools signed a Consent Order that required Stanley to conduct a RCRA Facility Investigation (RFI). In 1990 and 1991, Stanley Tools conducted a Phase I RFI. The main purpose of Phase I was to characterize waste and waste handling units on site ("solid waste management units", or SWMUs) and to determine the extent of soil, ground-water, and surface-water contamination arising from them.

Phase I identified 12 SWMUs and two additional "areas of concern." These are listed in Table 1. Figure 1 is a map reproduced from the Phase III report that shows the locations of the units and areas of concern.

Table 1

Solid Waste Management Units and Areas of Concern

Unit A: Former RCRA Surface Impoundment Area
Unit B: Original Effluent Pond
Unit C: Former Kerosene Settling Pond
Unit D: Former Kerosene Settling Pond
Unit E: Former Kerosene Settling Pond
Unit F: Untreated Sludge Disposal Area
Unit G: Chemfixed Sludge Disposal Area
Unit H: Sludge Spill
Unit I: Southern Drainage Ditch
Unit J: Wastewater Treatment Plant
Unit K: Former Underground Storage Tank Area
Unit L: Former Underground Storage Tank Area

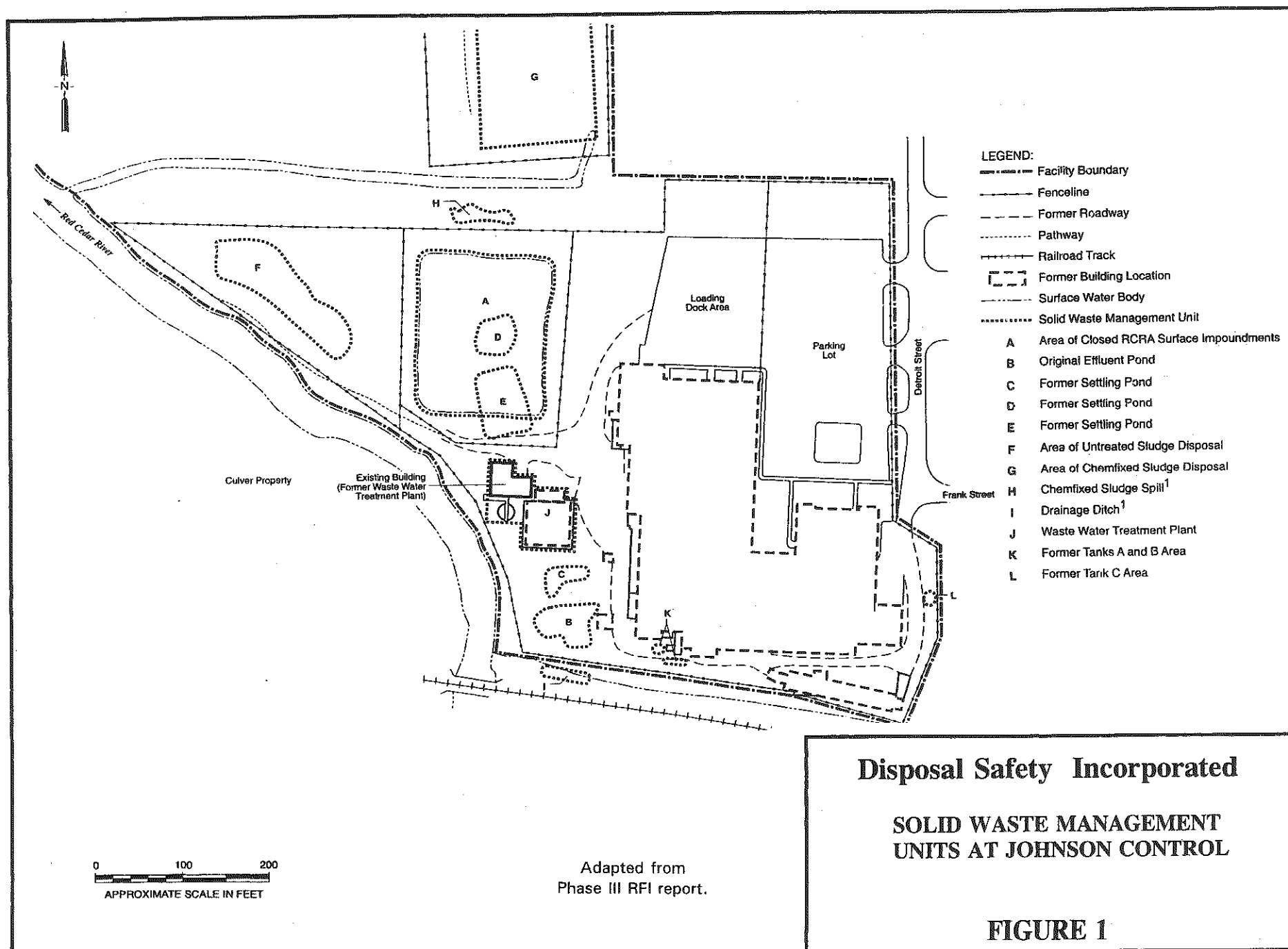
Area of Concern 1: Chromium Recovery Unit

Area of Concern 2: Product Release Area

In 1994, Stanley Tools conducted the Phase II investigation, designed to better delineate the extent of contaminant releases from specific SWMUs and the overall distribution of soil and ground-water contamination. During this investigation, numerous ground water, soil, sediment, and sludge samples were collected from the plant property, the Red Cedar River, and drainage ditches connecting the two.

In mid-2000, JCI conducted the Phase III RFI investigation to better delineate sediment and ground-water contamination. The sediment investigation evaluated the distribution of contaminants in river and ditch sediments that could degrade the ecology of the river. For this purpose, the Phase III report used USEPA Ecological Data Quality Levels (EDQLs), as well as other criteria developed by JCI, and stressed that the evaluation was for "screening purposes," not to establish clean-up goals. The ground-water investigation focused on the most serious





ground-water contaminant, trichloroethylene (TCE), a widely used industrial solvent. The objective was to better define the geometry of the TCE plume and identify its source area.

In July, 2001, USEPA asked JCI for an additional report to summarize and analyze the three phases of work. Although the Summary Report does not contain any new data, it does contain some new data synthesis and conclusions.

## 2.5 Wastes

The Phase I and II investigations identified a wide range of chemicals and waste components that exist in the various media at the site. The principal contaminants at the site are listed in Table 2.

Table 2

### Principal Contaminants

Metals and semi-metals:
tri- and hexavalent chromium, cadmium, mercury, copper, lead, nickel, and arsenic
Petroleum products/constituents:
bunker C oil, kerosene, fuel oil, xylene, and benzene
Cyanide
Polychlorinated biphenyls (PCBs)
Volatile organic compounds (VOCs):
trichloroethylene (TCE), 1,2-dichloroethene (DCE), vinyl chloride, chlorobenzene, methylene chloride, and dichloroethane (DCA)

## 2.6 Soil and ground-water contamination identified in Phase II

The Phase II report concluded that numerous operations and waste materials contaminated the site. Sludges in, or originating from, certain SWMUs were probable sources of soil, ground water, and sediment contamination. Some of these sludges contained concentrated metallic and organic contaminants. For example, the 1.2-foot-thick layer of sludge from the Original Effluent Pond (SWMU B), located in the southern portion of the site, contained concentrated zinc,

chromium, copper, nickel, phthalates (plasticizers), cyanide, petroleum hydrocarbons, TCE, DCE, and PCBs. Sludge in the Kerosene Settling Pond (SWMU C), contained the same metals and also phthalates, petroleum hydrocarbons, dioxin, and PCBs. Soils associated with these units show a related pattern of contamination.

Sampling in 99 borings located in a grid pattern across much of the site showed that soil contamination is widespread. Primary soil contaminants include metals, PCBs, petroleum hydrocarbons, phthalates, and polycyclic aromatic hydrocarbons. Contamination was also found in samples collected along the eastern bank of the Red Cedar River. With the exception of some obvious hot spots, the soil contamination wasn't easily tied to specific SWMUs. Much of the shallow ground water beneath the plant property contains elevated levels of arsenic, nickel, and zinc, but once again the pattern of contamination was not strongly correlated with specific SWMU locations.

Analysis for volatile organic compounds revealed that the southern portion of the site was highly contaminated with TCE, DCE, vinyl chloride, methylene chloride, and trichlorobenzene. These are all chemical solvents or their breakdown products. Maximum concentrations were in the thousands of ppb for TCE, DCE, and vinyl chloride. The highest concentrations occurred at the eastern property boundary, near a former underground tank that, according to JCI, stored fuel. The monitoring well network was not dense enough to yield a clear picture of the plume geometry or source areas. Despite this, JCI concluded that the source of the contamination could be off site.

The Phase II report also identified releases from a pipeline (identified as "Area of Concern #2") as a probable source of PCBs and petroleum hydrocarbons in the soil and ground water in the area.

## 2.7 Past remediation

Stanley Tools carried out two interim remedial measures in 1994 and 1995. Waste material was removed from sludge handling areas and a drainage ditch (SWMUs F,G,H, and I) and drums were removed from a burial area near SWMU B. Also, in 2001, JCI conducted an interim stabilization to stop the seepage of oil from the ground and abandoned pipes into the Red Cedar River.

### 3. Physical setting

#### 3.1 Geography and the river

Fowlerville overlies a glacial moraine with relatively poor drainage. The terrain is hummocky (irregular small hills) and marshy. The major geographic feature in the area is the Red Cedar River; this is a medium-sized river that flows north into Michigan's largest river, the Grand River, at Lansing. The plant is located on the western side of Fowlerville, and most of its acreage is in the floodplain of the river.

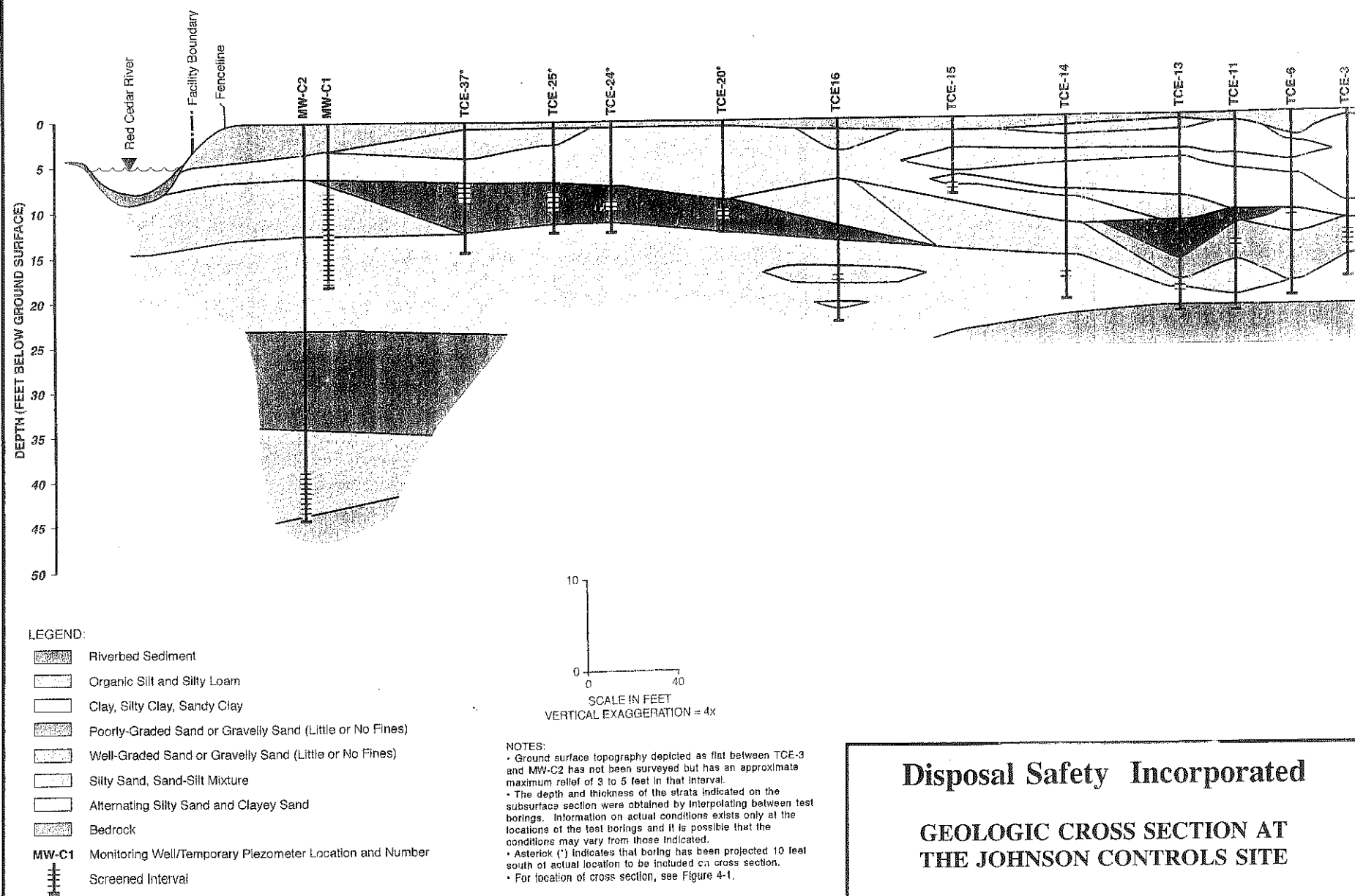
The western boundary of the site is the east bank of the river; the Chesapeake and Ohio Railway is the southern boundary. Topography at the site is nearly flat, with a slight westerly slope towards the river. Two drainage ditches in the northern and southern portions of the site conveyed wastewater and storm water from the plant into the river. In times past, two or more pipes from the plant also discharged directly into the river.

The JCI facility is located in a mixed-use area with residential, commercial, and industrial properties. The closest residences are approximately 300 feet away. The Phase II report lists several water supply wells within 3000 feet of the plant, including three public supply wells approximately 2000 feet northwest of the plant. A municipal sewage treatment plant is located approximately one-half mile north of the plant.

#### 3.2 Geology

Figure 2, reproduced from the Phase III RFI report, shows a cross section of the geology across the site, oriented along an east-west direction.

The site is underlain by three to six feet of surficial soils atop thirty-five to forty-five feet of glacial sediments. Sandstone and limestone form the bulk of the underlying bedrock. The surficial soils consist of the Linwood organic-rich muck near the river, the Berville loam across much of the rest of the site, and silty-sand fill in areas associated with the SWMUs near the river. As might be expected, the fill has higher hydraulic conductivity, lower organic content and lower porosity than the natural soils.



Adapted from  
Phase III RFI report.

**Disposal Safety Incorporated**

**GEOLOGIC CROSS SECTION AT  
THE JOHNSON CONTROLS SITE**

**FIGURE 2**

The Phase II report describes the glacial sediment as being divided into two zones: a 10-to-20 foot thick lodgement till (sandy clay/silt) overlain by a 20-to-30 foot thick zone of intermixed outwash and ablation till (predominantly silty fine sand or silty clay). The uppermost fine sand layer, which appears to have the greatest ability to transmit significant amounts of ground water, is thickest in the central portion of the site.

### 3.3 Hydrogeology

According to the Phase II and Phase III RFI reports, ground water in the sediments and underlying bedrock form a single aquifer system which is locally divided into sub-aquifers. Ground water flows most readily in two zones: an upper sedimentary horizon consisting of a group of fine sand beds, and a lower layer consisting of sandstone and shale bedrock overlain with dense, silty sand. The upper fine sand layers tend to thin with distance from the river and are interspersed with silty/clayey layers which act as semi-confining beds. Near the river, the semi-confining layers are largely absent. The Phase II report refers to the zone comprising the upper sandy layers and the semi-confining layers as the "upper facies," and the lower silty sand layer as the "lower facies." These relationships can be seen in Figure 2.

Slug tests were conducted in wells screened in the upper sandy zone. This type of aquifer test is not highly precise but provides a useful qualitative description. These tests yielded moderate hydraulic conductivities that ranged from  $2.4 \times 10^{-4}$  to  $4.8 \times 10^{-3}$  cm/sec. Conductivity tended to decrease with distance from the river; this is consistent with a thinning of the fine sand layer and progressively higher silt and clay content of the sediment. Laboratory tests of the silty/clayey material from the semi-confining layers yielded low hydraulic conductivities of  $10^{-7}$  cm/sec or less. Tests on the upper portion of the lower silty sand yielded hydraulic conductivities of  $9.8 \times 10^{-5}$  to  $7.4 \times 10^{-4}$  cm/sec, approximately an order of magnitude less than the upper sandy unit. Deep wells screened into the bedrock and the sediments immediately above it yielded hydraulic conductivities that ranged from  $10^{-4}$  to  $10^{-3}$  cm/sec.

### 3.4 Flow and transport

Beneath the site, the water table is approximately five feet below the surface. The ground-water gradient beneath the site varies with location and, to some extent, depth. In general, ground water flows from east to west, towards the boundary formed by the Red Cedar

River. In the southern portion of the site, the gradient in the shallow ground water steepens immediately adjacent to the river (within one to two hundred feet). In the northern portion of the site, this steepening is reduced or absent, and the gradient (hence the discharge) appears to vary with river stage. In the deeper (lower facies) ground water, the flow pattern resembles that in the shallow zone, but the gradient is less pronounced. A slight upward gradient between the deeper and shallower horizons indicates that ground water upwells prior to discharge into the river.

Based on three shallow monitoring wells on the west side of the river, the Phase II report concluded that ground water on that side flows east and discharges into the Red Cedar River; thus the river would act as a barrier to westward contaminant movement. But because there are no deep monitoring wells on the west side of the river, this conclusion has not been verified for flow in the deeper zone.

### 3.5 River quality

Beginning in 1964, the predecessor agency of the Michigan Department of Environmental Quality, the Department of Natural Resources, conducted a series of biological investigations of the effect of the Stanley site on the Red Cedar River near Fowlerville. In the 1960s, the agency concluded that discharges from the plant completely eradicated sensitive species for as far as 4.5 miles downstream. However, the Phase II report states that later surveys, performed in 1976 and 1991, point to improvements in river quality that may have resulted from the installation of a wastewater treatment plant at the plant in 1969.

## 4. Phase III ground-water investigation

JCI concluded in its Phase II report that the plume of TCE-contaminated ground water might originate off site — implying that some other company may have caused the problem. A primary objective of the Phase III RFI investigation was to better define the geometry and the source areas of the contaminant plume caused by TCE and its break-down products. The investigation included resampling of 21 existing monitoring wells, along with the collection of additional soil and ground water data at 30 new locations across the southern portion of the site using temporary wells.

Another important Phase III objective was to investigate sediment contaminant levels in the Red Cedar River and the drainage ditches connecting it to the plant and to conduct a preliminary assessment of the ecological risk to the river.

#### 4.1 Phase III TCE investigation findings

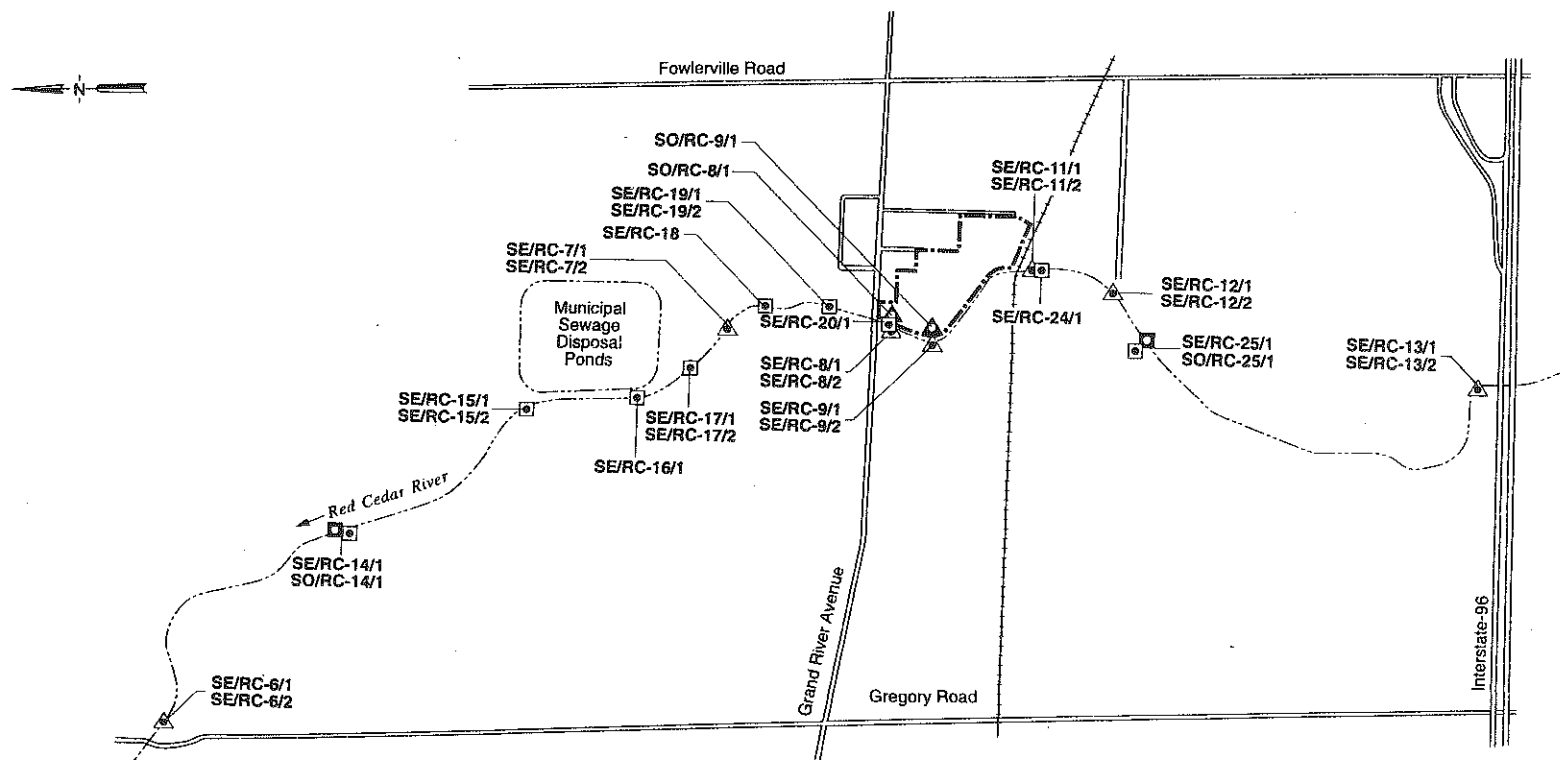
Phase III field work occurred between May and September of 2000. During the sampling of monitoring wells MW-C1 and MW-C3 (near the former settling pond), a layer of what resembled weathered (that is, old) kerosene up to two feet thick was found floating atop the water in the wells. This petroleum substance also contained 630 ppm of PCB.

JCI's interpretation of the horizontal and vertical distribution of TCE, its breakdown products (DCE, vinyl chloride) and other solvents is shown in Figures 3 and 4, reproduced from the Phase III RFI report. The plume is depicted as containing at least three large "hot spots" — areas of shallow ground-water contamination in which VOC concentrations exceed 10,000 ppb — along the flow path of the plume. The hottest is the central one, in which VOC concentrations total nearly 18,000 ppb. The three hot spots are embedded in what appears to be a roughly continuous spine of high concentrations along the longitudinal axis of the plume.

Comparison of JCI's plume map with the measurements it is based on reveals important features, many of which are downplayed or ignored entirely by JCI:

- The plume extends without interruption from the eastern boundary to the western boundary of the site.
- Ground water contaminated with volatile organic compounds (VOCs) discharges into the river.
- Because the sediments are complex and heterogeneous and the data are sparse, the geometry of the zone of greatest concentration is not well defined.
- Analysis of the aquifer material in the eastern and central hotspots, at the same depth as the water samples were drawn, yielded VOC concentrations of 25,000 ppb (location TCE-8) and 139,000 ppb (location TCE-15).
- The western hotspot (centered around location TCE-37) is the only ground-water sample in which TCE was not detected (but high concentrations of other VOCs were). It is located just 40 feet east of a former settling pond and is less than 60 feet from





**LEGEND:**

- Facility Boundary
- == Roadway
- ++++ Railroad Track
- Surface Water Body
- ▲ River Sediment Sample Location (January 1994)
- ▲ River Bank Soil Sample Location (January 1994)
- ◻ River Sediment Sample Location (September 2000)
- ◻ River Bank Soil Sample Location (September 2000)

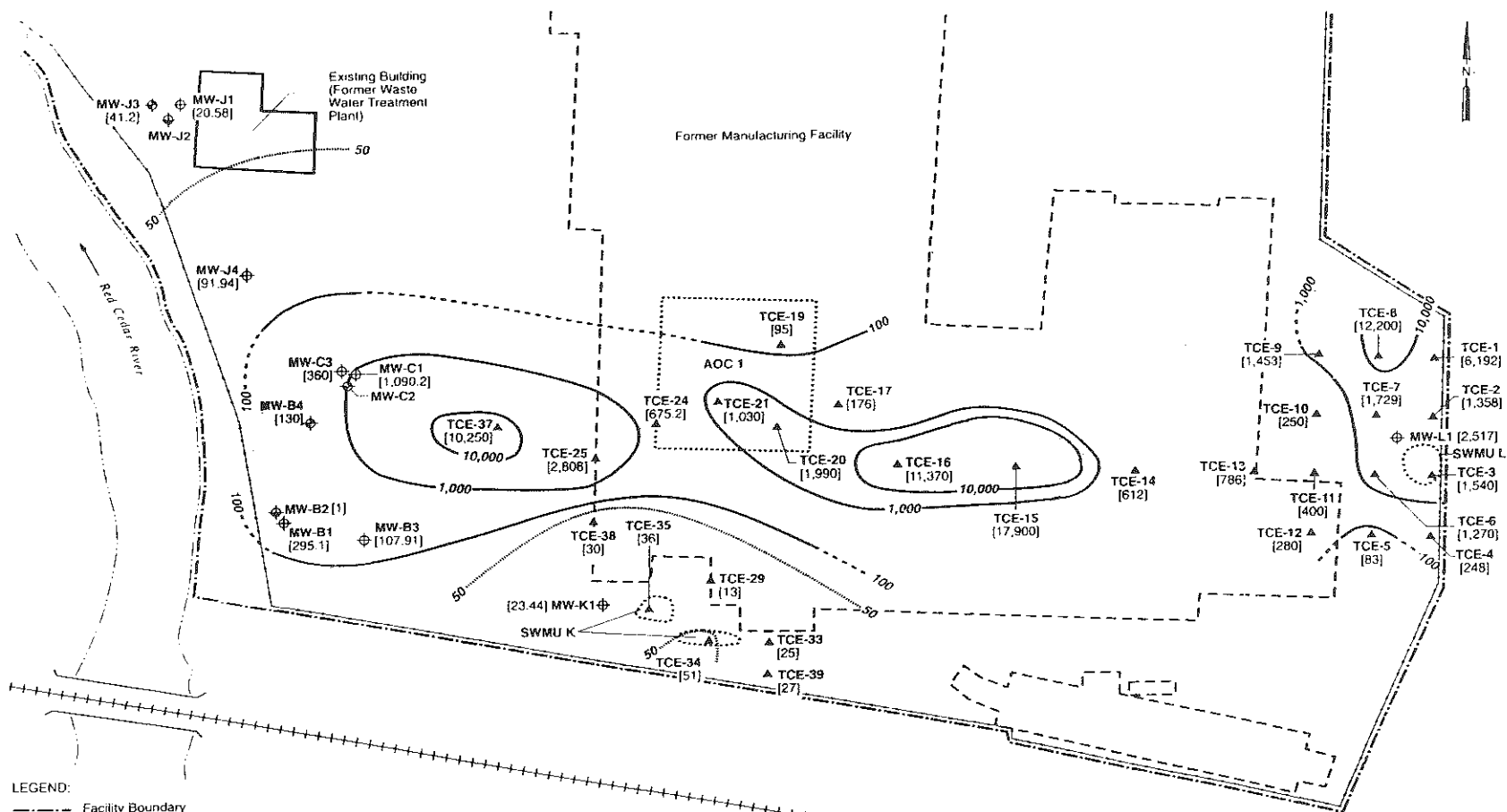
0 1000 2000  
APPROXIMATE SCALE IN FEET

Adapted from  
Phase III RFI report.

**Disposal Safety Incorporated**

**RIVER SAMPLING LOCATIONS AT  
THE JOHNSON CONTROL SITE**

**FIGURE 3**



LEGEND:

- Facility Boundary
- Fenceline
- Railroad Track
- Former Building Location
- Solid Waste Management Unit/Area Of Concern Location (See Figure 4-3 for SWMU Description)
- ▲ Soil Boring Location
- ⊕ Shallow Monitoring Well Location
- ⊕ Intermediate Monitoring Well Location
- ⊕ Deep Monitoring Well Location

[295.1] Total VOC Concentration in Groundwater Sample (µg/L)  
 --- 100 VOC Concentration Contour (µg/L) (Dashed Where Inferred) (Intermediate Value Contour Dotted)

Adapted from  
Phase III RFI report.

0 40 80  
APPROXIMATE SCALE IN FEET

BASE MAP SOURCE: Modified from Advanced Mapping Technologies compiled by photogrammetric methods from aerial photograph dated November 8, 1990.

## Disposal Safety Incorporated

### JCI'S TCE PLUME INTERPRETATION

FIGURE 4

monitoring well MW-C1 where kerosene was found floating on the water table. Water from TCE-25, located just 40 feet east of TCE-37, contained trace levels of xylene and isopropyl benzene, both petroleum product constituents.

- Ground-water sampling points TCE-37 and TCE-25 stood out from all others in that they contained vinyl chloride concentrations approximately one to two orders of magnitude higher than any other sampling point, and the vinyl chloride/TCE ratios were significantly higher than elsewhere.

Some conclusions that can be drawn from these observations are discussed in the following sections.

#### 4.2 TCE degradation at the site

Trichloroethylene degrades in the environment by sequential removal of chlorine atoms, a process known as reductive dehalogenation, when conditions are reducing (oxygen poor). This anaerobic degradation creates a series of daughter products in the water: dichloroethylene (DCE), vinyl chloride (which is more toxic than TCE), carbon dioxide and water. The concentration ratios among TCE and its daughter products depend on how much of the TCE has been degraded and on the relative speeds of the subsequent reaction steps. The factors that control the rates of the degradation reactions are not fully understood, but bacteria and certain metallic elements in the aquifer often play important roles. Since most shallow aquifers are oxygen rich, hence not reducing, TCE often persists for extended time periods in the ground water without significantly degrading.

The relation between degradation and oxygen is the opposite for petroleum products such as kerosene. These are biologically degraded by bacteria which continuously consume oxygen to sustain the reaction. Thus, the biodegradation of petroleum products often depletes dissolved oxygen in the ground water and promotes a reducing environment. In shallow aquifers, where the presence of oxygen ordinarily inhibits TCE breakdown, active degradation of petroleum can give rise to anaerobic, reducing conditions under which TCE breaks down.

It is clear that TCE is being degraded at the JCI site, but the reaction is not going to completion. Virtually all sampling locations along the plume still contained TCE and significant concentrations of DCE and vinyl chloride. The ratios among TCE and its daughter products along the length of the plume strongly suggest that degradation of petroleum products is

important at this site in controlling degradation of chlorinated compounds. For example, the areas in which the highest levels of vinyl chloride are present are in the vicinity of units which involved petroleum. Location TCE-37 is particularly significant because it had extremely high concentrations of the TCE breakdown products vinyl chloride (1700 ppb) and DCE (8,370 ppb), but TCE itself was absent. This might be explained by TCE-37's location immediately adjacent to wells which contain kerosene (possibly originating from operations related to the former settling ponds).

Past and present conditions are not a very good guide to future conditions because the changing petroleum concentrations in the subsurface may ultimately control the degree and duration of chlorinated solvent degradation. If the biodegradable constituents of the kerosene are exhausted or removed by remediation of relevant SWMUs, but TCE source areas are not controlled, then degradation will decrease.

#### 4.3 Problems with JCI's plume interpretation

The conclusions section of the Phase III report concedes that there are data gaps relating to the TCE plume in ground water but argues (p. 6-9) that "TCE impact diminishes in off-site directions and is not expected to persist at significant concentrations because of its demonstrated attenuation away from source areas." This conclusion is not supported by the data:

- The contaminant plume does not display "demonstrated attenuation away from the source area." The plume is continuous across the site, with maximum VOC concentrations roughly the same in the eastern (12,200 ppb), central (17,900 ppb), and western (10,250 ppb) portions of the plume. JCI's depiction of the plume as three distinct hotspots is not sufficiently justified by the data. For example, there are no data points to justify the closed concentration contours drawn north of TCE-15 and west of TCE-9.
- Johnson Controls drew Figure 5-3 of the Phase III RFI report (our Figure 3) in a way that suggests that little VOC contamination reaches the river. This is misleading. Wells as close as 50 feet from the river contain hundreds of ppb of VOCs, including vinyl chloride. There is little support for drawing, even tentatively, a 100 ppb concentration contour in front of the river.
- Although it is true that TCE is degrading along portions of the plume, the process has not gone to completion. TCE and its daughter products remain in all sectors of the plume. For example, monitoring well MW-C1, which is approximately 60 feet from the river, contained 700 ppb TCE. Even at sampling location TCE-37, where TCE

degradation appears to be most advanced because no TCE was detected, there is still 8,370 ppb of DCE and 1700 ppb of vinyl chloride.

- The daughter products are also quite toxic. The Phase III report listed USEPA's generic clean-up criteria for TCE, cis- and trans-dichloroethylene, and vinyl chloride as 5 ppb, 70 ppb, 100 ppb, and 2 ppb, respectively. These criteria are exceeded in all portions of the plume.

In Figure 5 we have redrawn JCI's plume map in a way that we believe better conforms to the chemical and hydraulic data. We have opened the 1000 ppb contour north of TCE-9 and TCE-15, and extended the 100 ppb contour to the river.

Although both the Phase III Report and the Summary Report repeat the claim made in Phase II that TCE contamination is entering the JCI facility from an off-site source to the east, the Summary Report tempers this assertion with a discussion of the far more likely scenario in which the contamination resulted from degreasing and other operations at the site. In this latter scenario, the hotspots represent areas of significant releases.

The Phase III ground water investigation data gives us a much better picture of the plume, but it is not yet complete. There are not enough deep wells to determine the presence or absence of deeper migration and the current data set does not yet identify a specific source of the TCE with any confidence. In particular, there is still nothing to support JCI's claim of an off-site source possibly caused by some other party.

It is not clear what JCI means by its assertion that TCE impact "diminishes in the off-site directions." The plume is moving in only one direction, west, and at least partly discharging into the river. As discussed above, the concentrations have not demonstrated much attenuation when the daughter products are also considered. The issue that needs to be addressed is the effect of a largely unattenuated plume either discharging into the river, or possibly migrating under it.



## 5. Sediment investigation

To meet the objective of determining the site's effect on the river, JCI collected both water and sediment samples from 13 river locations spanning 1 mile upstream and 1.5 miles downstream. Four locations along the South Ditch, which drains into the river, were also sampled for sediment contamination.

JCI evaluated the sediment data by comparing them to three different sets of "screening criteria," and argued that the least stringent set (which JCI developed itself) was the most applicable to the site data. In our view, JCI's preferred screening criteria were too lenient — that is, they would miss some cases in which the site is contaminating the river. Nevertheless, all three comparisons show that there is a problem. JCI glossed over this important result and downplayed the findings of sediment contamination caused by the site.

The most glaring example of this is that PCBs were not detected in any upstream samples, but were present in the sediment near and downstream of the site. Despite this, JCI never stated the obvious conclusion that the plant has contaminated the river with PCBs.

### 5.1 Screening criteria

To evaluate the river and sediment data, JCI compared the analytical results to three different, decreasingly stringent criteria. The first are USEPA's Ecological Data Quality Levels (EDQLs), which are intended to identify situations which may pose a threat to the river ecology and thus may require remediation. Concentrations in many samples exceeded these levels. In the Phase III report, JCI dismissed the EPA criteria as "generally conservative... as evidenced by numerous compounds [semi-volatile organic compounds, arsenic, cyanide, and cadmium] exceeding the criteria in upstream samples" (p. 6-4). This statement does not accurately reflect the proper use of USEPA's Ecological Data Quality Levels. The concentrations are tied to protecting river ecology, not distinguishing background<sup>1</sup> concentrations from site-derived contamination.

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<sup>1</sup>In the context of contaminant investigations, background is defined as the chemical concentration attributable to sources, natural or otherwise, other than the site under investigation.

JCI defined its second screening criterion as the 95% upper confidence limit of the maximum background concentration for each chemical species. This is a calculated value which should exceed the values measured in 95% of all background samples. The method used by JCI to calculate the confidence limits assumes that the sample concentrations for each chemical follow a normal distribution (bell shaped curve) and that enough samples were collected to fully describe the distribution.

The 95% upper confidence limits in the Phase III report were determined by statistically analyzing a relatively small number of upstream samples — eleven. Seven of these samples were collected in Phase II and only four in Phase III. This is not sufficient to develop robust statistics.

Furthermore, the conceptual basis for JCI's comparison of upstream samples to downstream samples is flawed. The rationale for using statistics is that there should be two statistically distinct populations if the site has contaminated the river. The best way to evaluate the degree of contamination is to fully analyze and compare the two complete sets of data. JCI did not do this. Instead, JCI compared individual downstream samples, one at a time, to the background range to reduce the number that could be blamed on the site.<sup>2</sup> Good methods do exist to distinguish background concentrations from site contamination [Magee et al., 1990], but they require a sufficient number of background samples and the use of appropriate techniques of analysis. Magee et al. recommend a more complete statistical analysis of background and site related samples to facilitate the development of meaningful screening criteria.

Johnson Controls did recognize one problem with the analysis. It found that many of the *upstream* concentrations exceeded the calculated confidence limits. In other words, there were non-normal statistical distributions of the contaminants. This may be true. But this may not represent a fundamental characteristic of the samples themselves. As discussed below, the non-

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<sup>2</sup>Comparing a single measurement to the 95% confidence limit of the background data set answers the question: "Could this sample have been found if there was no site contamination?" The proper question is: "Do the data as a group indicate that the site is or is not contaminating the river?" To answer this question, sample populations must be compared to each other, and the data must be searched for temporal and spatial trends that could be hidden by statistical analyses that lump together data collected at different times and places.



normal distribution may have arisen from improperly grouping old and recent data (which would combine two distinct populations).

Because concentrations in many of the upstream river samples exceeded the 95% upper confidence limit, JCI dismissed these screening criteria as "likely to be overly conservative" and argued for yet a third criteria to distinguish site contamination: the maximum measured upstream value for each potential contaminant. This value is, of course, distinctly non-conservative because it ignores the fact that sampling always yields distributions of concentrations, and distinct distributions frequently overlap. Thus, site contamination may have significantly elevated the mean concentrations of samples, but elevated individual samples may still fall below the maximum values measured in the background samples.

The way JCI calculated its maximum upstream concentration screening values is troubling in another way. The Phase III report states that, in general, concentrations in the river were lower during phase III (2000) than in Phase II (1994), thus the "Phase II data may no longer adequately characterize site conditions." JCI states that this justified using the Phase II data "only for characterization of upstream conditions" (page 6-8); that is, all other values used in the screening analysis were collected in Phase III. But comparison between the Phase II and Phase III data shows that upgradient contaminant levels have decreased in the subsequent six years, as would be expected if there was progress in cleaning up the river upstream of the plant. This means that the maximum upstream concentrations, which JCI argues are indicative of background, are based on a data set which may be incompatible with the downstream data, at least for the purposes of apportioning contamination currently attributable to the JCI site. For example, the maximum upstream values in Phases II and III were 35.8 and 11.1 ppm for arsenic and 12.3 and 6.7 ppm for chromium, respectively. Clearly, it makes the most sense to use measures of current background when evaluating the current and future impact of the site on the river.

## 5.2 Impact of the site on the river

The Phase III RFI seems to conclude that there is little present day impact on the Red Cedar River from the site. Exceedences of screening values are generally cited without comment, or dismissed as either "very limited" or within background concentrations. For example, even when chromium was found in the river sediment adjacent to the facility at

concentrations that exceeded the maximum measured upstream, the Phase III RFI report argues that it could "easily fall within the statistical distribution of background (given the non-normal distribution of the upstream data)" (p. 6-7). JCI also points to the municipal treatment plant outfall, and other things downstream, as possible sources of chemicals in the river.

Although we did not perform a statistical analysis of the data (and we question whether sufficient upstream data exists to perform one), we did calculate mean concentrations for PCB and chromium. These are listed in Table 3. The mean concentrations strongly indicate that releases from the JCI site have elevated PCB and chromium concentrations in the sediment.

Table 3

Comparison of Upstream and Downstream Mean Concentrations

Chemical	Mean Concentration of Samples (ppm)					
	Upstream of JCI		South Ditch	River Adjacent to JCI Site	River Downstream of JCI	River North of Sewage Treatment Plant
	Phase II and Phase III Data	Phase III Data				
Total PCB	Not detected	Not detected	3.4	0.040	0.040	0.020
Chromium	7.5	5.8	471.0	11.7	48.0	27.1

Another issue not addressed by the RFI concerns PCBs. On site, PCBs have been found in the subsurface dissolved in the floating kerosene phase. PCBs in the subsurface are ordinarily quite immobile, due to their low solubility and tendency to adsorb on soil particles. However, PCBs would move with the kerosene and could migrate into the river dissolved in the non-aqueous phase. Upon entering the river, PCBs dissolved in oil droplets would be much more likely to remain in the water column than PCBs in a water-sediment system. This could make them more bioavailable. Default risk assessment assumptions for PCBs in streams are based on a water-sediment system, and would not be applicable to PCBs dissolved in oil.

### 5.3 The South Ditch

Sediment samples from the South Ditch contained levels of PCBs, chromium, arsenic, cyanide, and mercury that exceeded EPA screening levels and JCI's as well. PCBs were found in four of five samples, with concentrations as high as 13 ppm; this is more than 100 times all three of JCI's screening levels. The ditch samples contained chromium as high as 955 ppm; this is 35 to 100 times JCI's screening levels. We note that although JCI compared contaminant concentration in the ditch to screening levels it developed from upstream river sediment, this is not useful for distinguishing contaminant origin. Unless it can be shown that the sediments in the South Ditch were predominantly deposited by flooding of the Red Cedar River, levels of chemicals in the ditch would have little relation to those in the upstream portion of the river.

## 6. Site-wide contamination

The Summary Report includes a great deal of information that is repeated from the three earlier RFI reports. It does add, however, a more detailed analysis of site-wide soil and ground-water contamination.

### 6.1 Soil

Phase I and Phase II soil contamination data are compared to Preliminary Remediation Goals set by USEPA Region 9 (California, Nevada, Hawaii, and Arizona). Figures 6-1 through 6-7 of the Summary Report show that soils covering much of the site exceed USEPA criteria for protection of ground water or for residential and industrial exposure to arsenic, chromium, and PCBs.

The Summary Report questions the significance of these exceedances, however, arguing that for arsenic, and to some extent chromium as well, background levels in the soil exceed the clean-up criteria. Johnson Controls asserts misleadingly on p. 6-6 of the report that most arsenic concentrations "are of a similar magnitude to the site-specific background values reported in Tables 5-24 and 5-25."

This statement about arsenic is misleading for several reasons. First of all, the values given in the tables are not supposed to be typical background concentrations, but are intended to be three standard deviations above the mean, and therefore should exceed 99% of all background concentrations. The highest such limit suggested anywhere in JCI's background table is 44.9 ppm, while concentrations over 60 ppm were measured in the soil and nearly 70 ppm was measured in the sediment of an abandoned pipe beneath the site. The arsenic in samples that exceed the calculated background limits is *not* background arsenic, notwithstanding that they are "of a similar magnitude" to one of the calculated limits.

Second, the background limits are not correct. JCI, claiming to follow MDEQ guidance, defines background values for each chemical as the mean concentration plus three standard deviations measured in on-site soil that is presumably uncontaminated. In the case of arsenic, JCI calculated the unusually high value of 44.9 ppm as the background concentration for the upper three feet of soil. There are several problems with JCI's calculation:

- JCI's background values are based on samples from only four locations. These are too few samples to generate reliable statistics when the coefficient of variation is large, which is the case for arsenic.
- The coefficient of variation for arsenic in the upper three feet of soil was 0.84. MDEQ guidance [MDEQ, 1994, p. 16] states that the three standard deviation method may only be used with a large coefficient of variation (greater than 0.75 for clayey soils) if a valid explanation is presented; otherwise another statistical method must be used.
- The geology across the site is quite variable, both horizontally and vertically. MDEQ guidance requires that background concentrations be calculated for each distinct stratigraphic horizon. This is important because clay has the highest background arsenic content of all soil types while arsenic concentrations are typically much lower in sand and other kinds of soil. All background samples were collected from a single, limited, area on-site where a few feet of clay overlie a sandy layer. Johnson Controls calculated a shallow background arsenic value (44.9 ppm, 0 to 3 feet below the surface) and a deeper one (3.4 ppm, 3 to 7 feet below the surface). Even if these values were correctly calculated, their use would not be proper; as MDEQ guidance states, background values should not be determined for depth intervals without distinguishing among soil types.

A further indication that there is something wrong with the JCI's value of 44.9 ppm for shallow background soil is how it compares with the values for arsenic in the Michigan Background Soil Survey [MDNR, 1991]. The maximum background arsenic value found in this state-wide survey of 311 samples was 39.0 ppm. The survey was subdivided by soil type and

geographic category. Out of 178 clay samples, the mean, the mean plus three standard deviations, and the maximum concentration were 8.8, 34.3, and 39 ppm, respectively. The mean, mean plus three standard deviations, and maximum of the 75 clay samples from Fowlerville's geographic category (the Saginaw glacial lobe) were 6.3, 27, and 30.6 ppm, respectively. JCI's proposed background of 44.9 ppm exceeds every measurement of arsenic background reported by the survey anywhere in the state, an extremely unlikely occurrence if it were accurate.

## 6.2 Ground water

Concentrations of chemicals in the ground water were compared with three screening criteria: Michigan Part 201 generic clean-up criteria for ground water at industrial and commercial sites, USEPA Region 9 preliminary remediation goals for tap water, and Federal maximum contaminant levels for drinking water. Figures 6-8 through 6-13 of the Summary Report show that significant portions of the site exceed these standards for one or more of four contaminants: arsenic, TCE, vinyl chloride, and cyanide.

The Summary Report states that Michigan Part 201 generic clean-up criteria and screening levels for industrial-commercial scenarios are "not available" for arsenic, chromium, TCE, and PCBs. But such values are in fact available. Pages 6.3, 6.4, and 6.7 of MDEQ's Op Memo 18 give the values.

## 7. Conclusions and recommendations

It is now more than twenty years since ground-water contamination was discovered beneath the Johnson Controls site in Fowlerville and PCBs were discovered in the Red Cedar River. Yet no remedy has yet been selected, let alone implemented. The pollution problem has not even been fully investigated — the horizontal and vertical extent of ground-water contamination has not been fully determined, and clean-up goals for the river sediment have not yet been set. Our evaluation shows serious deficiencies in the work done to date, and even JCI admits that there are still "limited data gaps" [p. 6-9 of the Phase III RFI report].

Once the investigation has been completed, the next step in the RCRA corrective action process is Corrective Measures. JCI is in the process of negotiating a new Consent Order with USEPA so it can begin a Corrective Measures Study (CMS). Under this regulatory approach, any additional investigation will be tied to whichever specific remedies are required by USEPA after it reviews JCI's CMS.

The data gaps we have identified are more severe than admitted by JCI. Furthermore, the existing data have yet to be fully or appropriately analyzed. Nevertheless, we agree that there are sufficient data to begin to consider different remedial options. Although more detail than is appropriate for this report will be required to fully evaluate clean-up requirements, we believe that the data lead to several basic conclusions, which are discussed below.

## 7.1 TCE plume

Data from the RFI investigation clearly shows that there is a continuous plume of solvent-contaminated ground water discharging into the Red Cedar River. More work will be needed to determine TCE source areas and the depth of the VOC plume. Additional permanent wells are recommended both on site, along the length of the plume, and off site east of the plant boundary and on the west side of the river. Several of these will need to be deep zone wells.

Under present conditions it is clear that natural attenuation<sup>3</sup> does not fully degrade the plume before it discharges into the river or, possibly, flows under it. Therefore, natural attenuation is not viable as a stand-alone remedy at the JCI site. Furthermore, on-going clean-up of the oily wastes and sludges at the site will tend to remove the oxygen sink; thus the degree of natural attenuation attributable to biodegradation could decrease in the future. At the very least, a much more comprehensive understanding of ground-water chemistry and TCE fate processes is required before natural attenuation can be considered even as a component of an engineered remedy. The National Academy of Sciences' Committee on Intrinsic Remediation [National Research Council, 2000] recently published guidelines for such evaluations.

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<sup>3</sup>Natural attenuation is defined as involving natural processes such as absorption, dilution, volatilization, chemical and biological degradation, etc. which remove or permanently immobilize contaminants in the subsurface. This is in contrast to engineered remedies such as ground-water pump-and-treat (ground water is pumped from the ground and cleaned), reactive barriers (ground water is directed to flow through a subsurface barrier that chemically destroys contaminants), and others.

After so many years of study, there is no reason for further delay before the VOC plume is contained. Several cost-effective methods, including well-based hydraulic containment and zero-valence treatment walls are available to do this. This site is well suited to these methods because the plume is relatively narrow and the aquifer transmissivities are modest. Pumping and treating ground-water hotspots can probably reduce the duration of containment, and would only require a few wells. If additional investigation identifies strong TCE source areas, then additional containment, treatment, or removal measures may be required.

## 7.2 River water and sediment quality

Past and recent investigations show that PCBs, metals, and other chemicals from the plant have contaminated the river and its sediments. JCI contends that the level of river and sediment contamination resulting from the JCI site has dropped over time. This may be true, but it is also clear that contaminant levels still exceed USEPA's Ecological Data Quality Levels, and that the JCI site continues to be a source for these exceedences.

Continued on-site clean-up of water, sludge, and contaminated soils associated with the known Solid Waste Management Units may facilitate further improvements in river quality over the long run. However, JCI's studies have identified pervasive site-wide soil contamination, and this too provides an ongoing source of contaminated water and sediment into the river. JCI needs to implement a comprehensive program to control all site-related discharges and run-off that could flow into the river. Controlling run-off into, and discharge from, the north and south ditches is central to this. Because ground water beneath most of the site contains elevated metals, including arsenic, ground-water discharges into the river may need to be controlled over a wider area than the TCE plume.

Because most of the site is situated on the flood plain of the Red Cedar River, remedial measures must be put into place to prevent contaminated soil from washing into the river during large-scale floods. This might include either excavation or capping of appropriate areas.

The extent to which remediation of river sediment is required is likely to depend on the results of a risk assessment. The National Academy of Sciences has described risk assessment as an "analytic-deliberative process" that requires representation of the spectrum of interested parties [National Research Council, 1996]. The Academy emphasizes that:

Of critical importance is maintaining the integrity of the analytic process; in particular, protecting it from political and other pressures that may attempt to influence findings or their characterization so as to bias outcomes.

As described throughout this report, studies carried out by JCI's consultants have shown a consistent bias in the direction of understating the degree of contamination. It is of great importance to avoid both the appearance and the reality of a biased risk assessment. For this reason, all risk assessments at this site should be conducted by USEPA staff.

In the risk assessment, special attention needs to be given to the possibility that PCBs are entering the river dissolved in kerosene. Because PCBs are hydrophobic, they ordinarily sorb strongly to sediment particles. PCBs dissolved in a liquid hydrocarbon phase would be less rapidly scavenged out of the water column and could be much more bioavailable.

### 7.3 Arsenic in soil

Arsenic concentrations in on-site soils are well above clean-up criteria. JCI has not correctly defined background levels, and therefore its suggestions that the arsenic may be background-related cannot be accepted. The arsenic problem requires further investigation to determine what kind of clean-up is necessary.

### References

Kolesar, A. L., Letter to F. Gomez, USEPA Region 5 Office of Regional Counsel, re: Former Stanley Tools Site; Fowlerville, Michigan, dated March 19, 1996.

Magee, B. R., Schuyler, S. E., and C. Kufs, The use of background concentrations in site assessments," in *Ground Water Management: Proceedings of the 1990 Cluster of Conferences*, Vol. I, pp. 861-876, February 20-21, 1990, Kansas City.

MDEQ, *Guidance Document, Verification of Soil Remediation*, Revision 1, Michigan Dept. of Environmental Quality, Environmental Response Division and Waste Management Division, April, 1994.

MDNR, *Michigan Background Soil Survey*, Michigan Department of Natural Resources Waste Management Division, April, 1991.



National Research Council, *Understanding Risk*, National Academy Press, Washington, 1996, p. 158.

National Research Council, *Natural Attenuation for Groundwater Remediation*, National Academy Press, Washington, 2000.

## Appendix A

### LIST OF PREVIOUS REPORTS ON THE STANLEY TOOLS SITE.

From the draft *Phase II RCRA Facility Investigation Task 10* report,  
Dames & Moore, 1994.

**TABLE 3-1**  
**LIST OF PREVIOUS REPORTS**  
**STANLEY TOOLS**  
**FOWLerville, MICHIGAN**

Report Title	Agency/Author	Date of Report
Utilex Corporation, Fowlerville, Michigan, March 27 and 28, 1956, Wastewater Survey.	MWRC, E. Shannon	Not dated
Report on Biological Conditions and Water Quality of the Red Cedar River as Affected by Discharges from the Hoover Ball and Bearing Company, Utilex Division, Fowlerville, Michigan. 1953-1967.	MDNR, R. B. Willson	Not dated
Report on Biological Conditions of the Red Cedar River as Affected by Discharges from the Hoover Ball and Bearing Company, Utilex Division, Fowlerville, Michigan.	MDNR, George Jackson	10/19/71
Biological Studies on the Toxicity and Biomagnification of Metals, Hoover Ball and Bearing Company, Utilex Division, Effluent and Red Cedar River, Fowlerville, Michigan.	MDNR, Mark Wuerthele	1/4/72
Michigan State University, masters thesis. Subject: To determine the effectiveness of new treatment facilities installed at a metal plating plant on a warm water stream (Red Cedar River).	Unknown	6/74
Compliance Monitoring Report, Hoover Ball and Bearing Company, Utilex Division, Fowlerville, Michigan, NPDES Permit MI 0003727.	U.S. EPA, Robert Buckley	7/74
Report of an Industrial Wastewater Survey Conducted at Hoover Ball and Bearing Company, Utilex Division, Livingston County, Fowlerville, Michigan, June 10-12, 1974.	MDNR, Bradley Brogren	8/12/74
Report of an On-Site, Continuous-Flow Bioassay Conducted at Hoover Ball & Bearing Company, Utilex Division and a Water Quality Study Conducted on the Receiving Waters Below the Plant Discharge, Livingston County, Fowlerville, Michigan, June 10-14, 1974.	MDNR	5/19/75
Report of an Industrial Wastewater Survey Conducted at Hoover Ball and Bearing, Utilex Division, All Outfalls No. 470003, Livingston County, Fowlerville, Michigan, June 23-24, 1975.	MDNR, Richard Christensen and Sidney Beckwith	8/7/75

TABLE 3-1 (Continued)

Report Title	Agency/Author	Date of Report
Report of an On-Site, Continuous-Flow Bioassay Conducted at Hoover Ball and Bearing Company, Utilex Division (Outfall 470011-001), Livingston County, Fowlerville, Michigan, May 24-28, 1976.	MDNR, Gerald Saalfeld	7/13/76
Report of an Industrial Wastewater Survey Conducted at Hoover Ball & Bearing Company, Utilex Division, All Outfalls No. 470003, Livingston County, Fowlerville, Michigan, May 24-26, 1976.	MDNR	7/15/76
Report of an Industrial Wastewater Survey Conducted at Hoover Ball & Bearing Company, Utilex Division, All Outfalls No. 470003, Livingston County, Fowlerville, Michigan, September 13-14, 1977.	MDNR, Roger Lemunyon	11/2/77
Water Quality and Biological Investigation of the Red Cedar River in the Vicinity of the Hoover Universal Die Cast Co., Fowlerville, Michigan, September 9, 1976 and January 24, 1978	MDNR, Susan Sylvester	6/78
Report of a Toxicity Evaluation & Industrial Wastewater Survey Conducted at the Hoover Universal, Utilex Division, All Outfall 470003, Livingston County, Fowlerville, Michigan, May 22-26, 1978.	MDNR	7/6/78
Letter from MDNR to Hoover Universal Corporation listing results of samples collected July 13, 1978.	MDNR, John Kraft	8/1/78
Biological Investigation of the Red Cedar River in the Vicinity of the Hoover Universal-Utilex Division, Fowlerville, Michigan, Livingston County, July 10, 1978-August 22, 1978.	MDNR, Gerald Saalfeld	6/10/79
Report of Daphnia Toxicity Screening Tests Conducted with Wastewaters from Hoover Universal - Utilex Division, All Outfall 470003, Livingston County, Fowlerville, Michigan, May 15, 1979 (Appendix A).	MDNR, Ronald Waybrant	7/26/79
Report of an Industrial Wastewater Survey Conducted at Hoover-Universal, Inc., Die Casting Division, All Outfalls No. 470003, Livingston County, Fowlerville, Michigan, May 15-16, 1979.	MDNR	7/30/79

TABLE 3-1 (Continued)

Report Title	Agency/Author	Date of Report
Report of an Industrial Wastewater Survey Conducted at Stanley Tools (formerly Hoover Universal), All Outfalls No. 470003, Livingston County, Fowlerville, Michigan, January 22-23, 1980.	MDNR, Martin Beck and Joseph Hey	3/25/80
Compliance Sampling Inspection for Stanley Tool, Fowlerville Plant, MI0003727, conducted by U.S. EPA Eastern District Office on September 22, 1980.	U.S. EPA	7/6/81
Report of an Industrial Wastewater Survey Conducted at Stanley Tool Company, All Outfalls No. 470003, NPDES Permit No. MI0003727, Livingston County, Fowlerville, Michigan, March 29-30, 1982.	MDNR, Peter Ostlund and Edward Hamilton	5/20/82
Report on an On-Site Toxicity Evaluation at Stanley Tool Company, Facility No. 470003, NPDES Permit No. MI0003727, Livingston County, Fowlerville, Michigan, October 4-8, 1982.	MDNR, William Erickson	3/83
Report of an Industrial Wastewater Survey Conducted at Stanley Tool Company, All Outfalls No. 470003, NPDES Permit No. MI0003727, Livingston County, Fowlerville, Michigan, October 5-6, 1982.	MDNR, Ralph Reznick and Joseph Hey	12/28/82
Quarterly Results (10/83) Groundwater Quality Assessment Program Stanley Tools, Fowlerville, Michigan.	Keck Consulting Services, Inc.	2/3/84
Quarterly Results (1/84) Groundwater Quality Assessment Program Stanley Tools, Fowlerville, Michigan.	Keck Consulting Services, Inc.	4/3/84
March 1984 Ground Water Assessment Report, Stanley Tools Plant, Fowlerville, Michigan.	Environ Corporation	2/27/85
Response to Comments on the March 1985 Groundwater Assessment Report.	Environ Corporation	3/21/86
Final Report, Ground Water Quality Assessment, Stanley Tools Plant, Fowlerville, Michigan.	Dames & Moore	7/10/87
A Biological Survey of the Red Cedar River, Livingston and Ingham Counties, Michigan (6/24-28/91).	MDNR, Staff Report	1/92

**FINAL DECISION AND RESPONSE TO COMMENTS  
SELECTION OF REMEDIAL ALTERNATIVE  
FOR  
JOHNSON CONTROLS, INC.  
(FORMER STANLEY TOOLS FACILITY)  
FOWLERVILLE, MICHIGAN  
MID 099 124 299**

**Introduction**

This RCRA Response to Comments (RTC) and Final Decision (FD) is presented by the United States Environmental Protection Agency (U.S. EPA) for the Johnsons Controls, Inc. site located in Fowlerville, Michigan. The purpose of this document is to identify the selected remedy, present concerns and issues raised during the public comment period, and provide responses. It consists of the previously issued Statement of Basis (Attachment I), and the Administrative Record (Attachment II). All of the comments received were carefully reviewed during the selection of the remedy, and have been answered in this RTC. The Statement of Basis provided the proposed remedy and was made available for public review and comment on August 31, 2006 through October 24, 2006. This FD supports the proposed remedy based on the Administrative Record (Attachment II). No additional alternatives were raised that were not considered in the Corrective Measures Study Report (CMS) and the proposed remedy was not altered as a result of public comments.

**Assessment of the Facility**

The response action documented in this Final Decision is necessary to protect human health and the environment.

**Selected Remedies**

The selected remedies for the site address past releases of chemical contaminants to soil, groundwater and sediments from manufacturing operations conducted from 1949 until 1985 when manufacturing operations at the facility ceased. The proposed remedies focus on reducing human and ecological exposure to contaminated media through removal of contaminated soils and sediments, the use of institutional controls, and monitoring the attenuation of contaminant concentrations in groundwater over time. Johnson Controls, Inc. (JCI), conducted Interim Remedial Measures in 2003 that consisted of removing and disposing of 83,900 tons of soil contaminated with volatile organic compounds (VOC's), metals, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAH's). Contaminated soil was excavated to the beginning of groundwater depth from areas across the facility property and from two areas referred to as the North Ditch and South Ditch, which feed into the Red



Cedar River. The excavated soil material was disposed off-site in an approved landfill. Clean soil used to replace contaminated soil was backfilled in the excavated areas to original grade.

- Implement Institutional Controls for Contaminated Soils.  
Institutional controls will restrict future facility uses to industrial purposes. Institutional controls would consist of deed restrictions, local ordinances and/or zoning that would limit the future use of the property and ensure that any direct human exposure to on-site soils would be so incidental as to pose little or no health threat. To the extent future conveyances of the facility property or any portion of it are planned, the institutional controls would ensure that the transferees were aware of, and bound by, the restriction.
- Implement Institutional Controls, Deed Restrictions and Long-Term Monitoring for Groundwater  
Institutional controls will consist of deed restrictions, and/or zoning or other local ordinances devised to prohibit the extraction of groundwater for consumptive or irrigation purposes in areas affected by the contaminant plume. Such controls would be implemented to prohibit the placement of potable or irrigation wells, limit excavations below the water table, and/or limit land uses to commercial and industrial development. Future redevelopment would be limited to industrial uses, disclosure of potential hazards would be provided to current and future on-site construction workers through a Health and Safety Plan, and any use of groundwater would be prohibited. Periodic review of institutional controls will ensure that future facility use is limited to activities that do not pose an unacceptable human health risk
- Monitored Natural Attenuation (MNA), and Mixing Zone Determination for Groundwater  
MNA consist of routine monitoring of the contaminant plume in accordance with an approved RCRA Groundwater Monitoring Program Plan. The Michigan Department of Environmental Quality (MDEQ) has completed a Mixing Zone Determination that has established maximum allowable contaminant concentrations in groundwater at compliance well locations specified near the Red Cedar River. Monitoring would continue until attenuation achieves groundwater cleanup goals. The applicable groundwater cleanup goals for on-site groundwater are the Michigan Department of Environmental Quality (MDEQ), Final Acute Values and the Part 201 Generic Groundwater/Surface Water Interface (GSI) Criteria. The MDEQ has established "Final Acute Values" which are maximum allowable chemical concentrations in groundwater that are protective of the environment. Selected monitoring wells will be analyzed for VOC's, Michigan 10 metals (plus nickel and hexavalent chromium), cyanide and Monitored Natural Attenuation (MNA) parameters.

The proposed monitoring program would protect human and ecological health in the future by assessing the concentration, migration and attenuation of hazardous constituents in groundwater.

- **Excavation of Red Cedar River Sediments**

Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. The degree of cleanup in the river sediments are based on the goal of protecting the animals that live part or all of their lives in the sediment ("benthic organisms"), which are important in the food chain of the river's ecosystem. Cleaning up sediments to protect the benthic organisms is expected to benefit the fish, birds, and mammals that inhabit or feed in the river; this will also help to keep the surface water clean.

Red Cedar River sediments will be tested in a laboratory to further evaluate their level of toxicity, in order to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals. Interim Measures completed in 2003 included the excavation and backfilling of the North Ditch and South Ditch, which drain into the Red Cedar River. EPA believes that the removal of contaminated ditch sediments has eliminated the inflow of contaminated sediments to the river.

### **Public Participation Activities**

The public comment period was announced through a newspaper advertisement, radio advertisements and online at the EPA website located at, <http://www.epa.gov/reg5rcra/wptdiv/permits/index.htm>. The public comment period ran from August 31, 2006, through October 24, 2006. The Statement of Basis (SB) and the supporting Administrative Record were placed in the Fowlerville District Public Library in Fowlerville, Michigan, and the U.S. EPA, Region 5, Waste, Pesticides, and Toxics Division Records Center for public review at the start of the public comment period.

### **Public Comments and Concerns**

Public comment was received from company representatives during the comment period. The public comments received addressed a couple of historical inaccuracies as presented in the Statement of Basis Document and are noted below.

**Comment:** "Buildings at the facility were demolished in 1993, and no structures of any type remain. The facility currently consists of a relatively flat grassy field. Johnson Controls, Inc. ("JCI") currently owns the facility." However, in 2005 Johnson Controls sold the eastern approximately 5 acres (the portion which lies outside the approximate floodplain) to American Compounding Specialties, LLC, which has constructed a plastics manufacturing plant on the property. EPA received notification of the transaction pursuant to the consent order.

**Response:** Comment Noted.

**Comment:** In the first paragraph of section 3.0, the text states: "JCI purchased the facility in 1985." Actually, JCI purchased the facility from Stanley in 1996.....

**Response:** Comment Noted.

### **Administrative Record**

The Administrative Record upon which the final remedy was selected is available at the Fowlerville District Public Library in Fowlerville, Michigan, and the Waste, Pesticides and Toxics Division Records Center of the U.S. EPA, Region 5 offices. Attachment II identifies the documents contained within the Administrative Record.

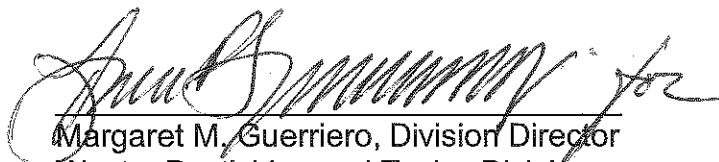
### **Future Actions**

Within 45 days of receipt of this Final Decision and Response to Comments, Johnsons Controls, Inc., must submit a Corrective Measures Implementation Program Workplan for U.S. EPA's approval. Within 30 days of U.S. EPA's approval of the workplan, Johnsons Controls, Inc. must commence the work. During the remedy implementation period, U.S. EPA will provide information to the public by updating the Administrative Record and conducting meetings, as requested.

### **Declarations**

Based on the Administrative Record compiled for this corrective action, U.S. EPA has determined that the selected remedy for the Johnsons Controls, Inc, site is appropriate and protective of human health and the environment.

Date: 12/1/06

  
Margaret M. Guerriero, Division Director  
Waste, Pesticides and Toxics Division  
U.S. EPA, Region 5

Attachments



September 5, 2001

U.S. Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

Attention: Mr. Juan Thomas, Project Manager

Subject: Confirmation of Extended Deadline  
Final RFI Report  
Former Stanley Tools Facility, Fowlerville, MI

At the request of Johnson Controls, Inc. (JCI), URS has prepared this letter as confirmation of a requested extended deadline for submittal of a Final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for the Former Stanley Tools Facility located in Fowlerville, Michigan.

During a phone conversation with Mr. Juan Thomas on August 23, 2001, a new date of September 30, 2001 was established and agreed upon for submittal of the Final RFI Report. This extension will allow us to incorporate into the Final RFI Report new data collected during the Interim Stabilization Measures activities performed August 15 through 21, 2001.


If there are any questions regarding the content of this letter or the status of the project, please do not hesitate to contact the undersigned at 513-651-3440 or Mr. Dennis Reis at 414-277-5523.

Sincerely,

URS



Michael A. Wagner  
Project Manager



Dennis P. Connair, C.P.G.  
Principal

MAW/DPC:JCI(020)121  
20209-020-121

cc: D. Reis, Quarles & Brady  
M. Stoelton, JCI

URS Corporation  
36 East 7th Street, Suite 2300  
Cincinnati, OH 45202  
Tel: 513.651.3440  
Fax: 513.651.3452



December 6, 2000

Mr. Juan Thomas  
U.S. EPA, Region V  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

Re: Response to Comments and  
Addendum to Interim Measures Work Plan  
Former Stanley Tools Facility  
Fowlerville, Michigan

Dear Mr. Thomas,

On behalf of Johnson Controls, Inc. (JCI), URS has prepared this letter to respond to U.S. EPA's questions on the October 19, 2000 *Interim Remedial Measures Work Plan (Work Plan)* prepared for the Former Stanley Tools Facility in Fowlerville, Michigan. In addition, this letter is intended to serve as an addendum to reflect URS' and JCI's understanding of the clarifications discussed and agreed-upon during our November 7, 2000 conference call. The document is structured to present a general re-cap of issues identified by U.S. EPA and its oversight contractor (TechLaw), along with URS' and JCI's response to the issues and proposed addendum to the work plan, as warranted. No formal comments were issued by U.S. EPA so the italicized typed sections below represent the general issues raised in the November 7 call.

*General Comments*

*U.S. EPA is concerned whether the scope of the IRM, as presented in the Work Plan, will limit Johnson Controls ability to respond in the event that the oil-saturated soil extends farther along the river bank than assumed in the work plan.*

It is JCI's intention to inhibit release of oil seepage into the Red Cedar River. In the event that field conditions indicate that the riverbank discharge zone is more extensive than assumed, the limits of the isolation and removal zone will be extended, upriver or downriver as needed, to assure that the entire limits of seepage are addressed. In order to assist in establishing the limits of work in the field, a detailed reconnaissance of the riverbank will be performed prior to initiation of site clearing activities.





U.S. EPA, Region V  
Mr. Juan Thomas  
December 6, 2000  
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*U.S. EPA questions whether the proposed barrier system will be effective in limiting the migration of oil laterally around the barrier, and whether monitoring systems should be installed to evaluate the long-term effectiveness of the barriers.*

URS believes that each proposed barrier will be effective in the near term inhibiting the migration of oil around the barrier system, and will likely be effective over the long term. The intention is to extend the barrier (liner) approximately 5 feet, both upriver and downriver, into the native soils located beyond the visibly impacted limits. Based upon the history of the site, the oil source has been present for a number of years. It has likely followed a preferential migration and discharge pathway, either along historic subsurface utility corridors or some other subsurface discontinuity. By constructing a barrier across the discontinuity, URS believes that the migration pathway will be interrupted.

At this time, URS does not believe that installation of a performance monitoring system is warranted. The need for such a system will depend upon the nature and extent of the oil-saturated soils, as determined from the test pit investigation. In the event that URS and JCI conclude that performance monitoring is needed, they will make a supplemental proposal to U.S. EPA.

*U.S. EPA is unclear whether a performance objective of the IRM is to address any possible source of oil, or addresses only the smear zone adjacent to the river.*

URS and JCI believe that the objectives of the IRM are adequately identified in Section 3.0 of the work plan. These are " ... to mitigate the identified oil seepage, and stabilize the situation until (at least) completion of the RFI." The performance measure will be " is there a visible discharge of oil from the site into the Red Cedar River?" The IRM will focus on remediation of oil-impacted soil immediately adjacent to the river, and construction of a barrier to subsequent flow. If oil discharges to the river are observed following completion of the IRM, it will be concluded that the IRM is not performing effectively.

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Mr. Juan Thomas  
December 6, 2000  
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*U.S. EPA is unclear where excavations will begin, and how the sampling is related to the excavation activities.*

As indicated in Figure 5, the site excavation activities will be performed in two separate stages. Initially, an excavation will begin approximately 5 feet landward of the river edge, and proceed further inland to remove visibly impacted soil. The sidewall of the excavation will be sloped to minimize the potential for instability. As such, it is anticipated that the oil-impacted zone will first be encountered approximately 10 feet landward of the river edge, and soil from that point landward will be removed.

Once this excavation is complete, portions of the excavated area will be backfilled and the barrier will be installed on the landward side of the excavation.

Following installation of the barrier, the remaining visibly impacted soil (located from just beyond the rivers edge to approximately 10 feet landward of the rivers edge) will be removed. It is after this second stage of excavation that the base and sidewall soil samples associated with the remediation areas will be collected.

In addition to sampling performed in the soils remaining beneath the remediation areas, there will be characterization sampling performed within the limits of the oil-containing soils identified during the test pit investigation. At least 2 soil samples, one within the oil-impacted zone and one in soil above the oil-impacted zone, will be collected from each identified source area. In the event that either source area extends over an area greater than 5,000 square feet, additional soil samples will be collected from that area to insure at least one pair of samples for each 5,000 square feet of visibly impacted area.

### ***Specific Comments***

*Section 3.3, Page 4. U.S. EPA is concerned that the excavation activities will impact existing monitoring well MW-J1 or MW-J2.*

The disturbed area associated with the excavation and removal activities will be limited to approximately 40 feet from the edge of the Red Cedar River. As such, URS does not anticipate that the excavation and removal activities will impact these wells. In order to inhibit damage to the wells, the Work Plan is amended to prohibit excavation within 10 feet of any monitoring well.





U.S. EPA, Region V  
Mr. Juan Thomas  
December 6, 2000  
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without the prior approval of U.S. EPA. In the event that other subsurface obstacles are encountered that affect the IRM, JCI will contact U.S. EPA regarding the issue and seek to reach agreement on how to respond to the issue without halting the IRM.

*Section 3.4, Paragraphs 2 and 4. U.S. EPA expressed concern that there may be slope stability issues associated with the excavations or backfill placement.*

As discussed during our November 7, 2000 conference call, the sidewalls of the excavation will be sloped to inhibit the potential for instability during excavation. In addition, granular fill (pea gravel or stone) will be used as backfill below and immediately above the water table to allow for reasonable compaction and strength through placement and compaction with the tires/tracks of the excavation equipment. In addition, the liner system will only extend approximately 1 to 2 feet into the sand layer below the water table. Groundwater located landward of the barrier will be able to flow in the sand beneath the barrier, thus minimizing the potential for development of excess water pressures that could lead to slope instability, or "blowing out" of the liner system.

*Section 4.0, Page 6. Clarification of quality assurance observations.*

The quality assurance observations during the IRM will be to assure that the visible limits of oil-impacted material adjacent to the river have been removed, that the subsurface barrier has been installed across the identified seepage pathway (and also extended 5 feet upriver and downriver from the identified seepage limits), that the excavations have been appropriately backfilled, and that the test pit investigations have identified the limits of visible impact associated with the northern and southern seepage areas. The reference to "landfill enhancement construction activities ..." is an error. The Work Plan will be amended to indicate that "Following completion of the Interim Remedial Measure construction activities ..." a certification report will be prepared.

*Table 1. U.S. EPA questioned why a cost for "Water Collection Treatment Allowance" is included in the cost estimate, but not discussed in the Work Plan.*

URS included this allowance because the contractor will need to collect, manage, and properly dispose of decontamination washwaters. In addition, it is likely that some water removal may be





U.S. EPA, Region V  
Mr. Juan Thomas  
December 6, 2000  
Page 5

required to avoid discharges to the Red Cedar River during the placement of backfill. As such, URS has recommended that a budgetary allowance for water management be included.

*Table 5. U.S. EPA questions whether the costs for sheet piling (discussed on Figure 5) is included in the cost estimate.*

The cost for the sheet piling has been included in the \$5,000 lump sum budget for installation of the barrier system.

*Need for permit. During the November 7, 2000 conference call, U.S. EPA questioned whether a permit would be needed for excavation activities adjacent to the stream or discharge of storm water adjacent to the river.*

URS contacted appropriate government agencies in order to evaluate potentially applicable construction or discharge permit requirements for the planned interim measures. A permit is required by the Michigan Department of Environmental Quality (MDEQ) Land and Water Management Division and the U.S. Army Corps of Engineers (USACE) for construction activities planned for land/water interface areas. Accordingly, a joint permit application will be submitted. The MDEQ has indicated that the application can be managed on an emergency basis to expedite issuance of a permit and authority to operate in regulated areas so that cleanup can be effected in a timely manner.

— ooOoo —



U.S. EPA, Region V  
Mr. Juan Thomas  
December 6, 2000  
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We understand that U.S. EPA and it's contractor will review this document to assure that it accurately reflects the November 7, 2000 discussions and that U.S. EPA concurs with the proposed modifications. If there are any questions or comments regarding this letter, please call.

Sincerely,

URS



Glenn I. Armstrong, P.E.  
Managing Principal



Dennis P. Connair, C.P.G.  
Principal

20209-016-121

Cc: D. Reis; Quarles & Brady  
M. Stoelton; Johnson Controls  
G. Mileskiy; Johnson Controls

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MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

November 10, 1982

TO: Bill Iverson, Groundwater Quality, Water Quality Division  
FROM: John Kraft, Water Quality Division, District II *JK*  
SUBJECT: Stanley Tools, Fowlerville

Stanley Tools (formerly Hoover Ball and Bearing Company, Utilex Division, and Hoover Universal) has been the subject of several priority task force investigations over the years. It was investigated by the Problem Evaluation Committee, the Groundwater Task Force, and most recently, has been placed on the list of sites known to be contaminated.

This plant is an electroplating and zinc die casting facility. It has been at this location over 20 years. They presently have a series of four settling lagoons as a final treatment step for their plating wastewaters. These lagoons are not lined. In years past, the lagoons were the treatment. Further back in time, there were lagoons in another location on the property prior to the present ones. There are also a few locations where sludges are buried on site (see map in hydrogeological report).

Our concerns for the possible contamination of groundwaters resulting from the present unlined lagoons and/or the old lagoons (now covered up), and/or the sludges buried on site, were expressed to the company in a meeting held at our office in 1978. We requested a hydrogeological study be done to answer these questions.

The people from Stanley agreed to do this. Keck Consultants drilled many monitoring wells at the site in 1979. We received a report of the study in January 1980 (attached). There was only one set of water sample data in the report, and the report is entitled, "Draft Copy". I have been questioning the people at Stanley about this ever since. The answer I get is that the report I have is exactly the same as the final report.

Other water samples from the monitoring wells have been collected, and we have the data. However, the people at Stanley feel that the data, other than that in the report, collected from 1979-81 were not very reliable. This is, they say, because several different groups of people were involved in collecting and analyzing the samples. Thus, we have not included these. The data collected starting in 1982, done according to their groundwater monitoring plan (attached), are reliable, they say, and these are enclosed. We have collected our own samples from some of their monitoring wells in 1980 and 1981 (attached).

*John Kraft* *\**

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Since 1980, we have been expecting Stanley to supply us with direct answers (and data to support them) to the questions we originally raised to them at our 1978 meeting. These were put in a letter to them in February 1982 (copy attached). We have not ever received these answers.

At our last inspection, in October 1982, we again asked about this. We were told that the hydrogeological study is complete. The report we have is the final report. Sampling of certain monitoring wells is being carried out according to their RCRA groundwater monitoring plan for that purpose. And, the report and data already given to us should provide the answers to our questions.

Therefore, the reason I am writing this memorandum to you is to request that you review the hydrogeological study report and data to see if you can answer the questions raised in our February 9, 1982 letter. These are needed if we are ever to resolve these issues. Otherwise, this plant will continue to be put on lists and be investigated without ever resolving anything.

One other smaller issue needs resolution. The groundwater monitoring plan designates well 7 as an upgradient well for purposes of monitoring the present lagoons. We feel that it is much too close to the lagoon to serve this purpose. Please resolve this matter as well.

The hydrogeological study report is our only copy. Therefore, please return it when you are finished. The rest of the material attached are copies of what we already have in our office.

If you need any more information or have any questions, give me a call at 322-1687. Thanks.

JK/sp

Draft Copy  
Hydrogeologic Investigation  
Plating Sludge & Residue Disposal Sites  
Hoover Universal Corporation  
Die Casting Division  
Fowlerville, Michigan

RECEIVED  
JAN 22 1980  
Water Qual.-Dist. II

## INTRODUCTION

Keck Consulting Services, Inc. was retained by Hoover Universal to evaluate the impact of past and current disposal of plating sludge and residue on the groundwater in the vicinity of the Die Casting Division Plant in Fowlerville, Michigan. The objectives of the study are listed below:

1. Define the subsurface lithologies
2. Determine direction and rate of groundwater flow
3. Evaluate the potential for contamination of usable aquifers in the area
4. Evaluate the potential for contamination of the Red Cedar River

## SITE LOCATION AND GENERAL GEOLOGY

The disposal sites are located in the SE 1/4, SW 1/4, SE 1/4 of Handy Township, Livingston County, Michigan (see Appendix A for Site Location Map). The facility is located on the southwest edge of Fowlerville, just east of the Red Cedar River.

The site is on ground moraine deposits from the Wisconsin glacial period. Typical of ground moraine deposits, the topography is flat to gently rolling. The site is located adjacent to the flood plain along Red Cedar River.

The Red Cedar River is the major channel for surface drainage in the area. Recharge to the river occurs from the surrounding swamps, the intermittent streams and man-made drains, and the Middle Branch River. The Red Cedar flows north past the facility and then flows west.

#### FIELD DATA

The subsurface lithologies were determined by profile auger borings. Soil samples were collected every five feet or change in formation. Two well clusters were planned for each boring with the general design to have the shallow well approximately 10 feet below ground level and the deep well approximately 35 feet below ground level. The primary formation found below 30 feet was clay, therefore, the shallow wells were installed to depths ranging from nine to 15 feet with the deeper wells generally set between 13 and 25 feet, depending on formation. A total of 17 borings were done (well location map is shown in Exhibit A) with 29 wells installed. The boring logs and survey data are shown in Appendix B and generalized lithologic profiles are shown in Appendix C.

The surficial deposits primarily consist of clay with interbedded sands. Sand occurs at the surface in borings 7, 8, 9 and 10, and clay occurs at the surface in all other borings. No sand was encountered in B4 or B16. The sand lenses in the other borings vary in thickness from four to 14 feet.

The depth to water table ranges from 0.85 feet (BGL) to 6.54 feet (BGL) for the shallow wells. Variation in static water levels is small between the shallow wells and the deep wells indicating that hydraulic connection is good between formations and there is very little potential difference between the different zones of groundwater. The variations that are notable may be due to the soil characteristics of the materials in which the wells are set. The shallow and deep wells in B17 have static water levels above ground surface. This is probably due to the loading effects of Chemfixed disposal area (north of the settling ponds) and the weight of the surface clay.

The data from the lithologic profiles indicates that the shallow sand lenses are the major avenues for groundwater movement from the site toward the Red Cedar River.

#### LABORATORY DATA

Permeability tests were conducted on 30 soil samples collected from the auger borings. Those results are shown in Appendix D. The permeabilities vary widely in the different formations. The formations can be grouped into three different classes; the first being clean sands, the second being sands with silts and clays and the third clays. The average permeability of the sands is 60.2 GPD/ft<sup>2</sup>. The sands with fine grained material have an average permeability of 6.9 GPD/ft<sup>2</sup> and the clays have an average of 2.0 GPD/ft<sup>2</sup>.



Water quality testing was done by Hoover Universal. The results of those tests are shown in Appendix E. The only wells showing significant quantities of cyanide, copper, and nickel are the shallow wells, OW's 2, 3, 4, 5, 6, 9 and 10. The deep well in OW4 also has detectable concentrations of CN, Cu and Ni, however in analyzing the wells logs, there is only four feet of separation from the bottom of the shallow well screen and the top of the deep well screen, with both set in a sandy clay sequence. Exhibit B contains a boring location map with the water quality results plotted at the well locations.

#### ANALYSES OF DATA

A groundwater contour map is shown as Exhibit C. The contours are based on the static water level elevations in the shallow wells. Generally, the water table contours follow the river, with the direction of groundwater flow toward the river. The contours show that the loading from the disposal sites have caused some alteration of the flow directions. This effect is restricted to the immediate vicinity of the structures. Eventually, the shallow water will discharge into the Red Cedar River.

The water table gradient also varies throughout the site. The steepest gradient is from OW7 southwest toward the river where the gradient is 0.016 foot/foot. The least gradient occurs in

the direction of flow (shown in Exhibit C) from OW8 toward the creek where the gradient is 0.0004 foot/foot. Based on the permeabilities and gradients, the range of flow velocities can be calculated using the formula shown below.

$$v = \frac{kI}{S_y} \times 7.48$$

where:

$v$  = velocity in feet/day

$k$  = permeability in GPD/ft<sup>2</sup>

$I$  = hydraulic gradient in ft/ft

$S_y$  = specific yield - fraction

7.48 = Gallons/ft<sup>3</sup>

For these calculations we will assume

$S_y$  = 0.2 for sand

$S_y$  = 0.05 for clays

The maximum flow velocity will be in the sand where the maximum gradient occurs.

$$v = \frac{60.2 \text{ GPD/ft} \times 0.016 \text{ ft/ft}}{0.2 \times 7.48}$$

$v$  = 0.64 ft/day - Maximum velocity

The minimum flow will occur in the clay formation where there is the least gradient.

$$v = \frac{2.0 \text{ GPD/ft} \times 0.003 \text{ ft/ft}}{0.05 \times 7.48}$$

$v$  = 0.016 ft/day - Minimum velocity

Based on the flow data, the volume of water passing through the site and into the Red Cedar can be calculated:

$Q = TIL$  where:

$Q$  = flow in gallons per day

$T$  = Transmissivity = km Avg. 600 GPD/ft

where:

$k$  - permeability = 60 GPD/ft<sup>2</sup>

$m$  - thickness of aquifer = Avg. 10 ft

$I$  = hydraulic gradient = 0.0078 ft/ft

$L$  = length of flow path along river - 640 ft

$Q = 600 \text{ GPD/ft} \times 0.0078 \text{ ft/ft} \times 640 \text{ ft}$

$Q = 2995 \text{ GPD}$

The majority of the water infiltrating from the surface into the groundwater will be discharged to the Red Cedar River through the sand layers. This is validated by the fact that deep wells set below zones of detectable concentrations of CN, Cu and Ni (exception in OW 4 where the deep well is in the same formation) do not show any CN, Cu or Ni.

Seven observation wells were installed (OW's 11 through 17) on the perimeter of the two Chemfixed material disposal areas. No Cn, Cu or Ni was found at either site.

The wells (OW's 3, 4 and 5) near the old settling ponds at the southwest corner of the facility do contain detectable chemical concentrations. The disposal of water in that area may have

created a mound resulting in back flow of water east and north around the disposal area spreading chemicals in the groundwater in the up gradient direction. Based on the current data, the groundwater in that area has returned to its natural flow direction toward the river. The chemicals detected in that area may have been caused by surface runoff during periods of excessive rainfall. Due to the changes in the area, the actual source of these chemicals is not known at this time.

Wells OW7 and OW8, located east and north of the existing settling ponds do not contain detectable concentrations of CN, Cu or Ni. The wells OW6 (south of the ponds), OW9 (west of the ponds) and OW10 (southwest of the ponds) show low concentrations of the chemicals. The cyanide in OW6 does not appear to be resultant of the existing settling ponds due to the direction of groundwater flow in that area. Sand occurs at the surface in OW9 and OW10, making it possible that the CN, Cu and Ni are a result of surface runoff from the existing settling ponds that has infiltrated through those surface sands. The chemicals may be from the old settling ponds in that area, however due to the direction of groundwater flow, it does not appear that their source is from the old settling ponds, unless the ponding of water resulted in alteration of the flow directions. At this time, it is difficult to assess the exact origin of the chemicals found in OW9 and OW10.

All borings on the site showed clay at depth. Considering that the sand lenses overlying the clay have a much higher permeability and discharge into the Red Cedar, the potential for chemicals to migrate vertically is very low. This is further varified by the lack of significant head potential between the shallow and deep wells.

The head differential between shallow and deep wells is very small, indicating that there is little potential for vertical migration of groundwater. This fact, along with underlying clay found would preclude the possibility that there is flow under the river.

#### REGIONAL GROUNDWATER

Area domestic well logs from the Michigan Geological Survey, Groundwater Section are contained in Appendix F. The majority of the domestic wells are set in the bedrock aquifer. One well log in the SE 1/4, NE 1/4, NE 1/4 of Section 10 (approximately 4000 feet from the facility) shows all sand to a depth of 46 feet. The borings did not locate any usable aquifers in the vicinity of the site.

## CONCLUSIONS

The data from this investigation suggests that there are three potential sources of the chemicals found in the groundwater. One potential source is leakage from the existing settling ponds. As stated earlier, we do not feel that this is a significant source for CN, Cu or Ni in the groundwater. The most probable sources are the old settling ponds or surface runoff.

The sand lenses are the major channels for groundwater flow toward the Red Cedar River. Water infiltrating the ground will migrate through those lenses toward the river, and consequently, any chemicals entering the groundwater will discharge (slowly) through those layers to the river. The head differential between shallow and deep wells is minimal and along with the underlying clays, appears to be little potential for groundwater flow beneath the river. At this time, the chemical concentrations found in the wells, suggests that the groundwater is not the major source for potential chemical leaching into the Red Cedar.

The clays underlying the upper sands provide a good barrier against vertical migration of groundwater. Chemicals which may enter the clays on the site will most likely be adsorbed by the fine grained materials. Metals and cyanides tend to be adsorbed easily by soils containing clays.

The major source for groundwater supply in the area is the bedrock aquifer. The depth to the bedrock in the area varies from 45 feet to over 100 feet. The amount of clay found at the site and the flow toward the river are the major factors in precluding the potential for chemical migration into usable aquifers.

### RECOMMENDATIONS

Surface water runoff has the greatest potential for entering the groundwater where sand is found at the surface (OW's 7, 8, 9 and 10). Potential sources of surface runoff are overflow of the settling ponds, barrel storage areas or areas where wastes have been stored on the ground. As these potential sources are eliminated, water quality monitoring should indicate whether or not that is the sole source for the cyanide, copper and nickel found in the groundwater.

If the water quality data shows no decrease in chemical concentrations after surface sources are eliminated, the most probable source is the old settling ponds. The amount of chemicals from the old settling ponds is finite and concentrations in the groundwater will decrease with time. Based on this and the current chemical concentrations in the groundwater, we do not feel that a groundwater capture system is necessary at this time. It is important that the water quality be checked in the observation wells periodically to determine the

Should there be questions regarding this report, please contact our office.

Respectfully submitted,

KECK CONSULTING SERVICES, INC.

Edward E. Everett  
Hydrogeologist/Project Manager

334-8623